



 MAY 2021

# Unlocking Investments in Regenerative Agriculture

White Space Opportunities for  
Scaling Sustainable Agriculture

**CREO**





## About CREO

The CREO Syndicate (“CREO”) is a 501c3 public charity founded by wealth owners and family offices with a mission to address the most pressing environmental challenges of our time — climate change and resource scarcity — that affect communities across the globe. By catalyzing private capital and scaling innovative solutions, CREO is helping protect and preserve the environment and accelerating the transition to a decarbonized and sustainable future.

CREO works closely with a broad set of global stakeholders, including Members (wealth owners, family offices, and family-owned enterprises), Friends (aligned investors such as pension funds), and Partners (governments, not-for-profit organizations, and academic institutions), who collaboratively develop and invest in solutions across sectors, asset classes, and geographies.

CREO activities include:

- 1) **COMMUNITY BUILDING**
- 2) **RESEARCH**
- 3) **PEER AND EXPERT-LED EDUCATION**
- 4) **DEAL ORIGATION**
- 5) **ACTIVE LEADERSHIP TO ADVANCE ITS MISSION**



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# Terms & Acronyms

## TERMS

**AGROFORESTRY:** The intentional integration of trees and shrubs into crop and animal farming systems to create environmental, economic, and social benefits<sup>i</sup>.

**BLENDED FINANCE:** The use of catalytic capital from public or philanthropic sources to increase private sector investment<sup>ii</sup>.

**CARBON SEQUESTRATION:** The locking of captured CO<sub>2</sub> into a reservoir. Common reservoirs include forests (afforestation and reforestation), soil (soil carbon sequestration), or rock formations beneath the earth's surface (geological sequestration).

**CATALYTIC CAPITAL:** Debt, equity, guarantees, and other investments that accept disproportionate risk or concessionary returns relative to a market-rate investment to generate positive impact and enable follow-on investment that would not have otherwise occurred<sup>iii</sup>.

**COVER CROPS:** Grasses, legumes, and other flowering plants for controlling erosion, increasing beneficial soil biota, suppressing weeds, providing habitat for beneficial predatory insects and wildlife, facilitating crop pollination, creating forage for farm animals, and improving soil structure, moisture, and nutrient content<sup>iv</sup>.

**IDENTITY PRESERVED:** A category of foods and products that have been tracked throughout processing, storage, and distribution to confirm the specific characteristics and the source of each item.

**PERENNIALS:** Plants and crops that grow for multiple growing seasons, as opposed to annual plants and crops that need to be planted every growing season.

Within regenerative agriculture, perennials commonly refer to permanent crops or other specialty crops (e.g., Kernza grain) that will last for multiple growing seasons.

**SILVOPASTURE:** The integration of livestock with trees and permanent crops that provide timber, fruit, nuts, and shade or shelter for livestock<sup>v</sup>.

**SOIL ORGANIC CARBON (SOC) AND SOIL ORGANIC MATTER (SOM):** Measurements for soil composition and health that can be used to estimate additional environmental outcomes, such as water retention.

**TILLAGE AND NO-TILL:** Tilling is an industrial agriculture practice through which previous crop residues and the top layer of soil are mechanically manipulated and laid bare in preparation of a new crop. No-till is a common regenerative agriculture practice in which tilling is avoided to protect soil health.

**WATER AVAILABILITY AND RETENTION:** Measurements often related to SOM, that calculate the amount of water in the soil available for plant uptake or the ability of the soil to hold onto water.

**WHITE SPACE OPPORTUNITY:** Market gaps that are (a) bottlenecks for growth in the supply chain, (b) high potential investment opportunities, or (c) high potential impact areas across climate, social, and health issues.

## ACRONYMS

**CIG:** Conservation Innovation Grant

**ESMC:** Ecosystem Services Market Consortium

**GHG:** Greenhouse Gas

**NRCS:** Natural Resources Conservation Service

**ROC:** Regenerative Organic Certification

**USDA:** US Department of Agriculture

# Executive Summary

## EXECUTIVE SUMMARY

The potential positive climate, environmental, social and health impacts that regenerative agriculture can create drives growing interest in the space. CREO's community of investors consistently ranks regenerative agriculture at or near the top of climate topic requests. Investors and practitioners, however, do not have a uniform or collectively agreed upon definition of regenerative agriculture — probing inspection of the terms “regenerative” and “regenerative agriculture.” Investors commonly refer to agricultural practices that enhance soil health, sequester carbon, improve water availability and quality, or benefit the environment as “regenerative,” while practitioners’ perceptions might slightly deviate. Establishing a fixed definition for regenerative agriculture is difficult, but actors can unite under its expected outcomes.

Using an investor's broad definition, regenerative agriculture activity is rising by several measures. A survey of major institutional investors and agriculture practitioners with explicit commitments to regenerative agriculture found that they have allocated, respectively, \$3 billion in financing and at least \$1.8 billion in internal spending or investing. There are also dozens of corporate and institutional investor commitments to natural capital or sustainable farming that include regenerative agriculture. Managers of 48 different funds have raised more than \$3.9 billion, much of it since the start of 2020, for regenerative agriculture. Capital from several sources is ready to flow to the field.

Investor enthusiasm for regenerative agriculture is well-founded and deserved, but how investors allocate their capital demands proper diligence and risk management because certain obstacles are pervasive. Fundamental investment challenges in this space primarily include

(a) mismatched cost and revenue timelines for transitioning farmland, (b) an underdeveloped full-scale supply chain, and (c) a confusing landscape of data management tools for verifying and monetizing environmental outcomes (e.g., carbon sequestration). The lack of a consistent definition or expected outcomes also leaves the entire sector vulnerable to reputational risk, as players can co-opt the term “regenerative” to describe practices with negative environmental impacts (e.g., heavy herbicide use). A complex definition also delays consumers’ understanding of regenerative agriculture and exacerbates the already uncertain timeline for when they might demonstrate a preference for regenerative products with their wallets. Regenerative agriculture demands clarity for widespread investor, grower, and consumer adoption.

Despite inconsistent nomenclature, a diverse set of asset classes has emerged for regenerative agriculture. Efforts to transition more acres or hectares of land to regenerative agriculture were once reserved to philanthropy and blended finance. Now, commercial-rate investors have access to real assets for traditional farmland conversion to regenerative management (e.g., Clear Frontier Agriculture Management), financial loan platforms for smaller farms or pooled projects (e.g., Steward), carbon market platforms (e.g., Nori), processing and distribution platforms connecting growers and buyers (e.g., Soil Heroes), and companies and technologies that simplify the transition process through better data management (e.g., Trace Genomics) or improved land management (e.g., Vence). The pathways for capital to enable regenerative practices are numerous.

To support growing investor interest in regenerative agriculture and to further pave the pathway for larger institutional follow-on capital, CREO has spoken to more than 85 investors, companies, and other actors to determine and describe five major “white space opportunities” to deploy capital. (See Interviews and Citations.) A white space can have three characteristics: (a) a bottleneck for growth in the supply chain, (b) a high potential investment opportunity, or (c) a high potential impact across climate, social, and health issues.

**48**

FUNDS WITH  
REGENERATIVE  
AGRICULTURE  
COMPONENTS

**\$3.9BN  
RAISED**

## FIVE WHITE SPACE OPPORTUNITIES FOR INVESTORS



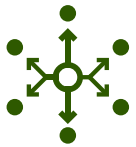
### 1. INPUTS, BIOLOGICS, AND SEEDS



### 2. CARBON AND ENVIRONMENTAL OUTCOMES TOOLS, FRAMEWORKS, AND MARKETS



### 3. NOVEL FINANCING FRAMEWORKS AND OUTCOMES BASED FINANCING



### 4. PROCESSING, STORAGE, AND DISTRIBUTION DEVELOPMENT



### 5. CONSUMER CONNECTION

CREO also identified four “enrichment areas” in need of capital. These segments will enhance the regenerative agriculture supply chain, but (a) may not have an immediate pathway for commercial-rate financial returns or (b) may have a scope beyond regenerative agriculture. These areas are particularly high leverage points for philanthropy or blended finance, investors thinking about broader systems outcomes, or specialist investors seeking particular social or environmental co-benefits.

## FOUR ADDITIONAL ENRICHMENT AREAS



### KNOWLEDGE SHARING



### ON FARM MACHINERY AND TECHNOLOGIES



### PERMANENT CROPS



### SMALL-SCALE GROWERS

This report includes global examples and investment opportunities. It focuses, however, on regenerative agriculture in the US because of advanced market-building and investment activity in the country. Opportunities in other regions and countries are quickly growing.



# Definition of Regenerative Agriculture

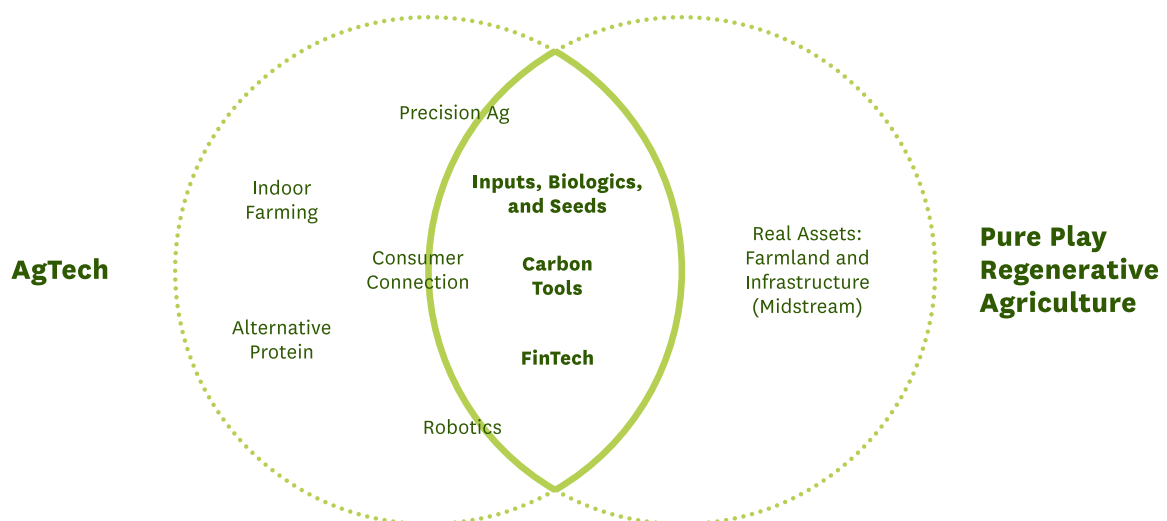
The definition of and expected outcomes associated with regenerative agriculture differ across actors, crops, and geographies. (See Appendix A for more details on definitions and practices.) The basic concept of regenerative agriculture is to take advantage of the natural tendencies of ecosystems to regenerate when disturbed. In other words, regenerative agriculture limits manipulation of the soil so that the land can “do its thing.” While the term might lack a consistent definition, several key principles and outcomes of regenerative agriculture practices include:

- Increasing carbon in the soil and other improvements to soil health (e.g., water retention)
- Protecting and restoring native habitat and biodiversity
- Eliminating the use of unnecessary & harmful inputs
- Supporting grower livelihoods
- Enhancing human and animal welfare

Regenerative agriculture is a way of raising crops and animals that, by working with natural systems, ensures the long-term viability and resilience of land to support generations to come. It provides environmentally-friendly products and services. Modern technologies, such as remote sensing to monitor and manage soil health, support and enable the adoption of regenerative agriculture. (See Figure 1.) Regenerative agriculture is on the other side of spectrum from extractive industrial agriculture.

AgTech and Pure Play Regenerative Agriculture can shift the agricultural paradigm toward practices that yield positive climate, environmental, social, grower, and health impacts.

Regenerative agriculture incorporates traditional farmland infrastructure (“Pure Play Regenerative Agriculture”) with innovative management and measurement practices (“AgTech”). The Venn diagram below shows how various agricultural niches are categorized under regenerative agriculture.



# Importance of Regenerative Agriculture

Regenerative agriculture has quickly gained prominence among stakeholders, from climate investors to major food corporations to grower communities. Based on different regenerative agriculture adoption scenarios, 14.5-22.3 gigatons of CO<sub>2</sub>-equivalent could be reduced by 2050. Such practices result in healthier and more carbon rich soils that can add up to 25 to 60 tons of carbon per acre and increase yields over time.<sup>vi</sup> Today, regenerative agriculture entails merging physical agriculture infrastructure with technical and biological innovations.

**CLIMATE IMPACT:** Agriculture, forestry, and other land uses account for as much as 23% of global carbon emissions,<sup>vii</sup> with livestock production accounting for up to 14.5% of total global emissions (i.e., including methane and other GHGs).<sup>viii</sup> To limit future emissions and restore soil carbon, agricultural practices must shift. Regenerative agriculture restricts emissions and builds up soil carbon through practices that avoid soil disturbance (e.g., no-till) as well as add carbon back to the soils (e.g., using manure, mulch, and crop residues to fertilize land).<sup>ix</sup> Industrial agriculture processes, like using chemical fertilizer, are renounced in regenerative agriculture and can further limit emissions. For example, wider adoption of regenerative agriculture could reduce ammonia production (the foundation of chemical fertilizer), which generated 448 tons of CO<sub>2</sub> globally in 2018.<sup>x</sup> Regenerative agriculture also has the lowest cost per ton among carbon removal solutions and one of the highest carbon removal potentials among natural and engineered negative emissions options (up to five billion tons, or five gigatons, of CO<sub>2</sub> per year).<sup>xi</sup> Nearly two gigatons of CO<sub>2</sub> per year

could be removed through improved soil management alone.<sup>xii</sup> Current industrial agriculture practices add emissions, while regenerative agriculture limits or even sequesters emissions.

**ENVIRONMENTAL IMPACT:** Regenerative agriculture can increase soil water retention, erosion control, flood control, marginal habitats, pollinator populations, and biodiversity among plants, soils, and species (especially with birds) as well as decrease irrigation needs and pollution runoff. According to the Food and Agriculture Organization, several alarming statistics indicate the need to regenerate soils and farmland. These metrics include: 24 billion tons of fertile topsoil are lost every year; 25% of the earth's surface (capable of feeding 1.5 billion people) has already been degraded; and globally there may be less than 60 years of harvests left.<sup>xiii</sup> Adopting an agricultural regeneration mindset can avoid further environmental degradation.



## **WATER & REGENERATIVE AGRICULTURE:**

Regenerative agriculture practices increase water retention and reduce water irrigation needs by increasing soil organic matter (SOM). A 1% increase in SOM can increase water availability by up to 20,000 gallons (75,700 liters) — almost an inch (or over two centimetres) of rainfall — per acre. This estimate is based on assumptions about the type of soil and its maximum retention potential. Water retention varies by soil type, geography, crop, and various other factors.<sup>xiv</sup> Beyond minimizing water use, regenerative also reduces pollution runoff by avoiding chemical pesticides, herbicides, and fertilizers.

To test the impact of organic and no-till practices on soil health and water quality, the Rodale Institute and the Stroud Water Research Center are running and monitoring a six-year regenerative agriculture project in the Delaware River Watershed. Initial results from their organic and no-till plots show reduced nutrient leaking and higher water retention.<sup>xv</sup>

**SOCIAL AND GROWER IMPACT:** Healthier and more financially stable production systems for growers and laborers result from regenerative agriculture. Its practices establish more climate resilient and consistent revenue bases by diversifying crops, creating equal or improved yields compared to industrial operations, and reducing input needs (e.g., chemical pesticides, herbicides, and fertilizers). Reducing chemical inputs on farms limits carcinogenic, respiratory, and other health problems among growers. Moving toward regenerative agriculture can ameliorate adverse effects many low-income communities and communities of color experience from industrial farming, such as air pollution, carcinogenic exposure, water pollution, reduced land values, and damaged fishing and recreation economies. The health and financial outcomes from regenerative agriculture can significantly improve the livelihoods of growers and their surrounding communities.

**HEALTH IMPACT:** The connection between increased soil health from regenerative management and increased food nutrient quality is becoming clearer. Poor soil quality is responsible for negative effects on

human health, such as nutrient deficiencies. Healthy soils can lead to positive effects on human health by producing antibiotic-producing organisms and other immunoregulatory-improving microbiomes as well as by decontaminating toxic waste.<sup>xvi</sup> Regenerative agriculture's positive impact on soil and human health is becoming increasingly valuable as business and investment strategies embrace food-as-medicine and nutrition-focused approaches. Beyond avoiding the negative health impacts of industrial agriculture, regenerative agriculture creates positive health impacts like more nutrient-dense foods and communities.

While the positive climate, environmental, social, grower, and health impacts are numerous, capital flow to regenerative agriculture has been fragmented. Mapping the flow of products, services, and capital in regenerative agriculture could encourage more targeted and impactful investment efforts.

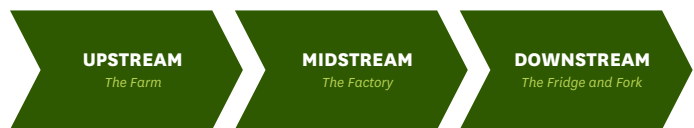
# Capital Flow for a Regenerative Agriculture Supply Chain

A regenerative agriculture supply chain and market do not currently exist at scale. The following sections provide an overview of the regenerative agriculture markets, capital needs to scale the market, capital providers that need to be involved, norms that need to be shifted, and a landscape of existing investments.

## REGENERATIVE AGRICULTURE MARKETS

Regenerative agriculture generates products (e.g., crops and livestock) and beneficial ecosystem services, as opposed to the industrial agriculture that provides just products. It therefore offers two markets for revenue. Pure Play Regenerative Agriculture (i.e., real assets like farmland and infrastructure) and AgTech investments improve and increase the supply of both products and services. Below are frameworks for the markets of regenerative agriculture products and services.

## PRODUCTS



The flow of products is the “supply chain.” The supply chain for agriculture — industrial or regenerative — can be broken down into three components: upstream, midstream, and downstream. In other words, products flow from the farm (where crops are grown), to the factory (where crops are processed, stored, and disturbed), to the fridge and fork (where crops are sold and consumed).

The supply chain for industrial agriculture is developed and mature. Regenerative agriculture’s supply chain, on the other hand, is undeveloped and nascent. To fully unlock and scale regenerative agriculture, various components of the supply chain need investment — whether adapting an old asset and narrative or adopting new ones. For example, growers transitioning from industrial to regenerative agriculture can use the same tractor but might need new seeds for crop diversity and manufacturers can use the same freezers but might need new processing lines for regenerative certification.

## ECOSYSTEM SERVICES

Regenerative agriculture, beyond just offering products, can also provide services — like water retention and carbon sequestration. Investment opportunities to develop regenerative agriculture’s ecosystem services can be plotted along the supply chain for products. Below is a framework that exhibits how services flow for regenerative agriculture.



Growers are the sellers of services, and individuals or groups (e.g., corporates) are the buyers. Buyers can directly purchase ecosystem services, which are typically packaged as a “credit,” from sellers or they can indirectly purchase ecosystem services through a marketplace that aggregates credits from sellers.

All parts of the regenerative agriculture product and ecosystem service markets — some more than others — will need capital to scale.

## CAPITAL NEEDS

Scaling regenerative agriculture, especially in industrial agriculture economies, requires capital to convert existing or degraded farmland to regenerative practices — a hurdle also experienced in the organic movement. Table 1 qualitatively illustrates the costs, savings, and long-term gains associated with transitioning farmland from industrial to regenerative practices. Existing information demonstrates long-term economic gains can be made without premium prices.<sup>xvii</sup> Several farmland managers and investors believe small sections of farmland can be gradually transitioned to regenerative practices while avoiding the losses experienced converting to organic. More data is needed though on the broad economics of regenerative agriculture — especially data that address differing farmland baseline qualities, crops, geographies, and practices — to understand the full scope of losses and gains.

For case studies on farm transition costs and revenues, please see the Environmental Defense Fund’s [Farm Finance and Conservation report](#). It includes quantified examples from conservation tillage and cover crop practices on farms in the US. Embracing these efforts resulted in up to \$47 gains per acre for corn, up to \$50 gains per acre for soy, up to \$5 gains per acre for wheat, and up to \$20 gains per acre for sorghum. Reduced human labor costs were seen across crop types, including corn, wheat, and soybeans, and rotations. The gains from shifting to regenerative agriculture are not theoretical; they are empirically proven.

**TABLE 1: OVERVIEW OF THE FARM-LEVEL COSTS AND GAINS TRANSITIONING TO REGENERATIVE FARMING<sup>xviii</sup>**

UPFRONT COSTS	UPFRONT SAVINGS	LONG-TERM GAINS
Seeds for cover crops, hedge rows and other integrated plantings	Reduced costs for fertilizers, herbicides, pesticides, and other chemical inputs	Increased yields
Increased labour costs (crop-dependent)	Reduced labour costs (crop-dependent)	Increased climate, weather, and pest resiliency of crops
Additional or updated machinery and technologies	Reduced fuel and equipment rent/leases	
	Reduced pollinator rental charges and fees	

To make the short- and long-term gains associated with regenerative agriculture more attractive and familiar, the norms and opinions people have about these more sustainable practices will also need to change.

## CHANGING AGRICULTURAL NORMS

Financial and environmental gains from regenerative agriculture have not shifted agricultural behaviors. Current supply chains operate on an established set of norms that have contributed to a myriad climate, environmental, and social issues. Table 2 shows how current agriculture norms, when paired with a changing-inducing sector, can shift toward a set of ideal regenerative agriculture norms. These new norms rely on various actors to provide support, funding, or investment for their development. Identifying norms of the current agricultural system helps unearth white space opportunities for investors (and other actors) in regenerative agriculture.

As with the development of other markets, regenerative agriculture capital needs vary across the supply chain. Large amounts of private and philanthropic capital, as well as political and financial regulation, will be needed to scale the industry. Grants and concessionary capital from philanthropic and blended finance actors will be key to advocacy campaigns, non-profit agriculture programs, and pilot projects that can experiment with and scale novel regenerative agriculture investment models. The history and capital gaps specific for philanthropic actors in the US are outlined in more detail in the report, [Barriers for Farmers & Ranchers to Adopt Regenerative Ag Practices in the US](#).<sup>xix</sup> Changing norms applies to everyone from growers to investors.

## BLENDED FINANCE WITH THE FUNDERS FOR REGENERATIVE AGRICULTURE AND THE NATURE CONSERVANCY

[The Funders for Regenerative Agriculture \(FORA\)](#) is a network of philanthropies with the goal of increasing the adoption of regenerative agriculture, starting in North America.

In the wake of the 2020 coronavirus pandemic, the group launched a pooled fund, the Promoting Economic and Ecological Resilience (PEER) Fund, with the support of the Walton Family Foundation and the 11th Hour Project to assist an urgent, collaborative, and system-wide response for the regenerative supply chain. Wave I (\$245,000 total) funded 19 organizations with grants ranging from \$5,000 to \$17,500. Additional \$1,000 honoraria were given to applicants unable to receive more funding. The fund prioritized groups that serve Black, Indigenous, People of Color (BIPOC) groups and included paid advisors in the BIPOC community to ensure the inclusion of grassroots leaders in the grant-making process.

The fund will grow in future iterations and develop additional funding pathways, including through blended finance and concessionary capital, for scaling and improving inclusion in the regenerative agriculture space.

The Nature Conservancy (TNC) has also begun to work with blended finance to scale and catalyze the shift to a comprehensive soil health agenda. Through a recoverable grant, TNC is making program-related investments in early-stage companies whose solutions will help scale agricultural practices that build soil health. Through an agtech-focused venture capital firm, TNC is building a curated portfolio of companies advancing regenerative agriculture practices.



**TABLE 2: TRANSFORMING NORMS: HOW DIFFERENT ACTORS CAN SHIFT THE AGRICULTURE INDUSTRY FROM INDUSTRIAL TO REGENERATIVE**

CURRENT AGRICULTURE NORMS		CHANGE-INDUCING ACTORS		IDEAL REGENERATIVE AGRICULTURAL NORM
<ul style="list-style-type: none"> <li><b>CONSOLIDATED BUSINESSES</b></li> <li>Over the past few decades, consolidation has increased across the agriculture industry. In the US, farms with at least 2,000 acres comprised 37% of total cropland in 2017 compared to 15% in 1987. Technological advancements generating better management of more land are partially responsible. However, the growth of major agribusiness companies and globally-integrated business models are more significant contributors to why it is difficult for small and medium scale alternative supply chains to succeed. Additionally, many growers, agriculture retailers, and input providers are dependent on agribusiness and the status quo business model.</li> </ul>	+	<ul style="list-style-type: none"> <li><b>CORPORATES:</b> See sections on Inputs, Biologics, and Seeds; Processing, Storage, and Distribution Development; and On-Farm Machinery and Technologies.</li> <li><b>PRIVATE CAPITAL:</b> See White Space sections on Inputs, Biologics, and Seeds; Processing, Storage, and Distribution Development; and On-Farm Machinery and Technologies.</li> </ul>	➔	<b>HIGHER AVAILABILITY OF APPROPRIATE INPUTS, EQUIPMENT, AND MIDSTREAM CAPABILITIES</b>
<ul style="list-style-type: none"> <li><b>HISTORICALLY INGRAINED FARM PRACTICES</b></li> <li>Industrial farming practices among growers have been ingrained across generations and continue through a suite of technical assistance programs, university and agriculture extension programs, public programs, and training support. Low margins, existing risks (e.g., weather and pests), and other farm management stressors create risk aversion toward the adoption of new practices and technologies.</li> </ul>	+	<ul style="list-style-type: none"> <li><b>EDUCATION:</b> Agriculture education in university programs can incorporate regenerative agriculture. Family offices and other actors can develop independent education institutes or farm training programs centered on regenerative agriculture.</li> <li><b>GOVERNMENT:</b> Public regulations and programs play a large role in changing this norm, such as the USDA's Conservation Innovation Grant (CIG) program for building and sharing knowledge on regenerative agriculture.</li> <li><b>NON-PROFITS:</b> This space needs continued program and advocacy campaigns for grower engagement, support, and education.</li> <li><b>PHILANTHROPY:</b> As most of the work in this space is not investor relevant, capital needs will be dependent on philanthropy to support non-profit programs, advocacy campaigns, and education.</li> <li><b>PRIVATE CAPITAL:</b> See White Space section on Consumer Connection.</li> </ul>	➔	<b>INCREASED KNOWLEDGE SHARING</b>
<ul style="list-style-type: none"> <li><b>LIMITED BANKING REGULATIONS</b></li> <li>In the US, current financial regulations are tied to industrial agriculture production and output. For example, annual operating loans are tied to crop insurance regulations, which often prevent the integration of cover crops or other regenerative practices.</li> </ul>	+	<ul style="list-style-type: none"> <li><b>INSTITUTIONAL FINANCE:</b> Changes here rely on updates to financial farming regulations, especially around crop insurance criteria and needs.</li> <li><b>PRIVATE CAPITAL:</b> See White Space section on Novel Financing Frameworks and Outcomes-Based Financing.</li> </ul>	➔	<b>OUTCOMES-BASED FINANCING</b>



Non-profit advocacy groups, funded by public and private capital, and government regulation will drive the grassroots change in norms toward regenerative agriculture. To reach economies of scale and overcome challenges for the industry, different types of investment and activity are needed.

Two broad challenges that investors face in regenerative agriculture are (a) the lack of a regeneratively-grown product premium that could financially support multi-year farmland transition periods, as exists with organic products, and (b) an early and unorganized data management field for confirming and monetizing benefits, especially for carbon sequestration. Many large regenerative growers, especially in grains, will certify as organic to capture the price premium. However, there is a gap for growers dedicated to regenerative practices, as they are unaligned with organic standards or unable to afford the organic certification cost. Regenerative agriculture would have greater returns than industrial agriculture if ecosystem services were accounted for, such as carbon sequestration and water sanitation or through [True Cost Accounting](#). Institutional and market-rate investors need to understand the importance longer-term financing in this space to match return profiles with industrial agriculture.

In the US alone, more than \$700 billion in investments will be needed over the next 30 years to scale the regenerative agriculture market — generating \$10 trillion in net financial returns.<sup>xxii</sup> The investment need globally is estimated to be \$450 billion.<sup>xxiii</sup> Over 400 million small-scale growers worldwide have historically practiced forms of regenerative agriculture and require more innovative financial and business support to compete in regional and global markets. Opportunities for investment are extensive.

The 2019 [Soil Wealth](#) report from the Croatan Institute reviews the broad landscape of investable strategies for all classes of investors in the US.<sup>xxiv</sup> It identified \$47.5 billion in investable strategies with regenerative agricultural features, including \$5.3 billion in public debt and \$8.4 billion in public equity. The bulk of this funding lies with \$22.8 billion in farmland and real assets, which is less than 1% of farmland assets in the US. A CREO review of companies in the US, Australia, Europe, and the Middle East found at least \$4 billion in funding already invested in 167 companies. Appendix B reviews over a dozen funds in the US, Australia, and Europe that represent more than \$2 billion in capital dedicated toward regenerative farmland and real assets. Current investments in regenerative agriculture, compared to the \$700 billion need in the US alone, highlights the huge gap of capital needed to move

to the market. The \$10 trillion in potential returns and history of success among regeneratively-minded companies could attract more investors and capital.

Notable exits with companies that support regenerative agriculture allude to industry tailwinds. CPG company Annie's, which has a [Soil Matters](#) campaign marketing the importance of regenerative agriculture, was acquired by General Mills for \$820 million in 2014. Annie's acquisition pushed the broader corporate toward regenerative agriculture. In 2019, General Mills announced it would convert one million acres to regenerative agriculture by 2030. Natural food brand acquisitions have spurred regenerative-focused change within large corporates in other industries. For example, Shell, an oil and gas major, acquired [Select Carbon](#), a carbon farming company in Australia, for an undisclosed amount in 2020. (Appendix C has additional information on the state and recent history of regenerative agriculture investments.) The products and ecosystem services regenerative agriculture provides have both resulted in lucrative exits, perhaps attracting more corporate activity.

A CREO review of corporate commitments found \$1.3 billion committed across two major food brands and a dozen other food companies to transition their supply chains to or invest in regenerative agriculture practices. For example, The Nature Conservancy, Cargill, McDonald's, and Target announced a partnership in 2020 to sequester 150,000 metric tons of carbon by working with growers on 40,000 hectares of land to incorporate soil health practices.<sup>xxv</sup> The regenerative agriculture space will scale as corporate commitments are fulfilled and investors become more engaged.

Investor interest has been increasing in tandem with demand. For example, [Transformational Investing in Food Systems \(TIFS\)](#), a group of investors including the Swift Foundation, is working on a three-year initiative to improve global food systems, especially through regenerative agriculture. The large amount of investor interest and funding across asset classes demonstrates a path to readiness for the sector to attract institutional investment. Previously, many pilot projects were supported by philanthropic capital, blended finance, or government grants. Much innovative work still relies on these funding sources — with hopes to reach commercial sizes.

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## **CAPITAL CLASS OPPORTUNITIES TO ENGAGE WITH IN THE REGENERATIVE AGRICULTURE SPACE:**

- 1. VENTURE CAPITAL AND PRIVATE EQUITY:  
TECHNOLOGIES, PLATFORMS, AND BRANDS**
- 2. REAL ASSETS: FARMLAND AND  
INFRASTRUCTURE**
- 3. FUNDS: FARM SUPPORT**
- 4. DEBT VEHICLES: FARM SUPPORT**
- 5. CATALYTIC CAPITAL AND BLENDED  
FINANCE: MULTIPLE TRANCHE FUNDS, PROGRAM-  
RELATED INVESTMENTS (PRIS) AND MISSION-  
RELATED INVESTMENTS (MRIS), GREEN BONDS**
- 6. PHILANTHROPY: GENERAL SYSTEMS SUPPORT**

Capital to grow regenerative agriculture needs to be strategically deployed. Certain gaps in the market yield greater impact while others yield greater return. In philanthropy, for example, capital accepts lower returns and serves as a tool for de-risking innovative solutions for other investment vehicles or educating consumers about the nascent industry. Directing capital class to the appropriate gap can help efficiently and effectively unlock the entire market.



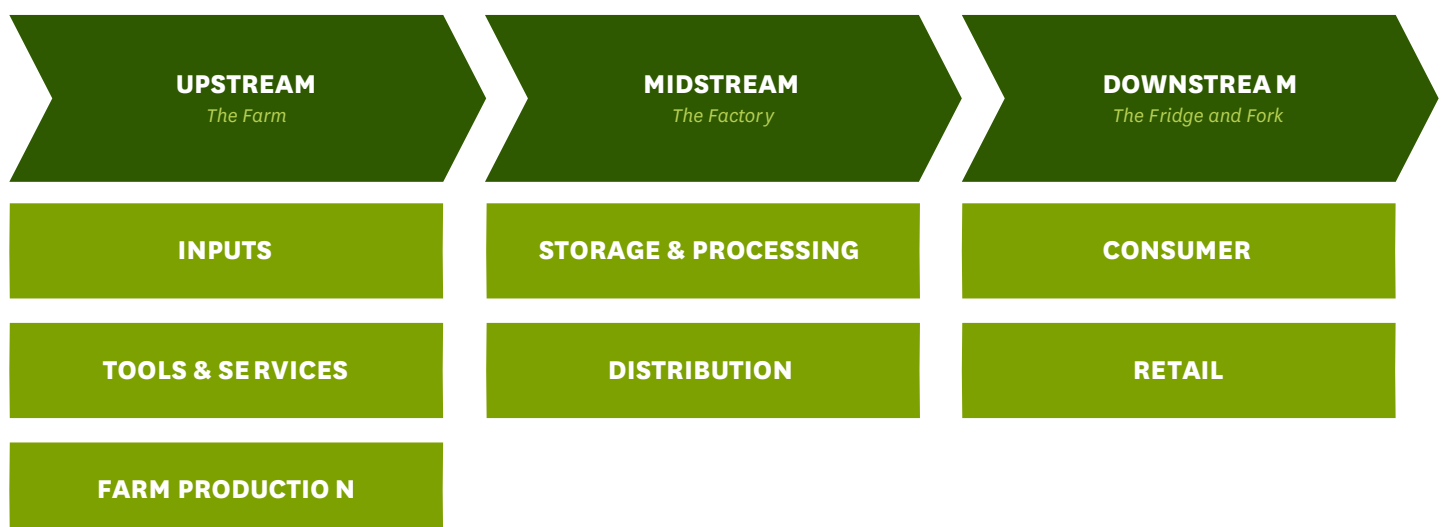
# White Space Opportunities for Investment

Through the norm identification above and the review of existing data on regenerative agriculture investments to date, there are five major white space opportunities that are (a) bottlenecks for growth in the supply chain, (b) high potential investment opportunities, or (c) high potential impact areas across climate, social, and health issues.

1. **Inputs, Biologics, and Seeds**
2. **Carbon and Environmental Outcome Tools, Frameworks, and Markets**
3. **Novel Financing Frameworks and Outcomes Based Financing**
4. **Improved Midstream Processing and Distribution**
5. **Consumer Connection to Nutrition**

These white space opportunities can be plotted on the following supply chain. Investing and providing other funding to these spaces helps to build the markets for regenerative agriculture's products and ecosystem services.

On the following pages, the key opportunities and challenges that define these white spaces are described.



# 1.

## INPUTS, BIOLOGICS, AND SEEDS

**The status quo for agriculture retailers and input providers needs to allow growers to escape industrial agriculture sales cycles and access products that support regenerative systems.**

Industrial inputs (e.g., seeds, herbicides, pesticides, fertilizers, and feed and health products) are designed to sustain the short-term growth of plants and animals, as opposed to the long-term health of the soil that supports them. While not always a Pure Play Regenerative Agriculture approach, input products and technological innovations can beget regenerative agriculture adoption when thoughtfully incorporated into farms and their long-term goals. Current markets for seeds, fertilizers, feed and health products, and other chemical inputs are well-established multi-billion-dollar markets resistant to disruption. Making regenerative inputs more accessible to growers could open the gates to midstream and downstream opportunities.

Investments in this space span across brands and technologies that are (a) conducting research and development on and deploying new inputs, biologics, or seed varieties (e.g., Trace Genomics), (b) creating an accessible marketplace for inputs (e.g., [SeedLinked](#)), or (c) selling natural inputs and seed varieties (e.g., [High Mowing Seeds](#) or chef Dan Barber's [Row 7 Seeds](#)) that focus on nutritional quality. Historically, these new products and platforms have been attractive to corporates.

Crop inputs, especially biopesticides, have an established history of corporate acquisitions. For example, Bayer acquired AgraQuest for \$425 million; Mitsui acquired [Certis](#) for an undisclosed amount; and Sumitomo acquired [Valent Biosciences](#) for an undisclosed amount. Biostimulants have attracted similar interest. For example, Syngenta acquired [Valagro](#) for an undisclosed amount. While none of these acquisitions explicitly target regenerative agriculture, the companies' practices are consistent with regenerative agriculture criteria and can be used as a data set of investment exits and growth in the space. Interest and activity in biologically-based inputs have prompted intrigue and development of other sustainably-minded products.

Of alternative inputs, microbial fertilizers and biopesticides were two of 24 hot spots for agribusiness investment identified by a McKinsey & Co. analysis due to their high CAGRs (7% or more from 2010-2020).<sup>xxvi</sup> Both are high margin and rapid ROI products for customers that fit into existing production processes and fulfill growing trends toward sustainable farming products. The above acquisitions have driven additional capital to biopesticide companies including [AgBiome](#), [Terramera](#), and [Vestaron](#) as well as catalyzed investment into the biofertilizer market (e.g., [Pivot Bio](#) and [NewLeaf Symbiotics](#)) — which to date has not seen the M&A activity of pesticides and stimulants. New opportunities vary for these regenerative agriculture products: transition the industrial fertilizer input market toward the still nascent biofertilizer and biologics market; cultivate products to be high margin at scale; lock in multi-year customer contracts; offer rapid ROI products to customers; and slot products into well-known production processes. Despite being attractive investment areas, regenerative agriculture inputs, biologics, and seeds have been a source of financial losses for well-intentioned investors

### Key challenges encountered by investors and to consider include:

- **Timelines to first revenue:** Developing these products requires discovery work, manufacturing scale-up, and field trials. They also need to be tested across different crop types, climates, and countries to produce a comprehensive data set. These data require replication and validation across each crop. Growers typically require three seasons of consistent data to accept and implement a product. Depending on crop type and pre-launch R&D, first sales might not take place until two to five years after initial product testing.
- **Sales strategy:** As companies reach commercial scale, they must choose among direct-to-farm, vertical integration, and distributor-led models. The direct-to-farm model can come with prohibitively high set up costs. The vertical integration model requires extensive financing, repeated alignment with shareholders over multiple financing rounds, and managing hybrid business models along with distribution activity. For these reasons, many biologics companies target regional or local distributor partnerships with small direct sales. Distributors find engaging with novel biologics companies challenging, as they are not used to supporting technical sales to risk-averse growers.

Companies must overcome hurdles for distributors like grower education and training as well as fear of cannibalization in existing upstream relationships with national distributors. The increasing number of biologic companies is also putting pressure on distributors to rationalize inventory/product lines and to focus on companies with extensive field trial data and balance sheet strength.

- **Staffing:** There is a shortage of managers with experience building both distribution networks and sales strategies for technical products. Managers with this profile are expensive because of their experience and the flow of capital entering the space. Staffing risk has been encountered where production process knowledge is poorly documented or resides among several individuals. Mistiming the transition from scientific founders to commercial management, risking the opportunities for a product to scale, is also common.

## 2. CARBON AND ENVIRONMENTAL OUTCOMES TOOLS, FRAMEWORKS AND MARKETS

**Regenerative agriculture needs to be underwritten by reliable soil carbon markets to increase opportunities for growers and investors. Development of accurate tools, tested metrics, and consistent frameworks will help grow the space.**

Measurement and monetization of carbon sequestration and other environmental outcomes create additional revenue streams to support farmland transitions to regenerative agriculture. New technologies introduce a level of traceability, a growing consumer demand, into agricultural supply chains that previously did not exist. Development of complementary markets (e.g., for water retention and biodiversity conservation) will contribute to greater transparency. These markets will depend on a soil carbon science consensus (including on [additionality](#) and [permanence](#) concerns) and on how outcomes can be measured at scale, as data collection and confirmation are still in their infancy. Making investment in environmental outcomes and their associated suite of technologies more attractive will require some changes.

According to several investors managing multimillion-

dollar farmland real asset funds, overcoming the cost of verification, which includes sampling and auditing, requires the price of soil carbon exceed \$20 per ton. This value surpasses the current mid-teens benchmark in the regulatory carbon market in Australia and in voluntary soil carbon agreements in the US and Brazil. Some voluntary markets in Europe, though, are seeing prices as high as the mid €40s (~\$47.60) per ton, especially through direct partnerships with corporates. Without parallel price increases in other markets, environmental outcomes might struggle. The Chicago Climate Exchange (CCX), which acted as a voluntary carbon trading platform for North America and Brazil, included a soil carbon component. The CCX ultimately shut down in 2010 after seven years of operation due to system design issues that left the market with low prices and subsequent low participation. An unfriendly political landscape toward climate and carbon trading globally at the time also contributed to its demise. Climate-friendly governance and regulated carbon trading might yield a higher price but do not ensure market engagement or verifiable soil science.

In 2020, the Australian regulatory market supported soil carbon prices hovering around \$16AUD (~\$12.35USD). This regulated soil carbon market is still in its nascency though, as the Australian government is the main buyer of credits. Scientists globally are still unsure of the science behind the additionality and permanence of soil carbon in different practices (especially outside of cattle grazing). Verification prices are also so high that many project developers put the onus of monitoring and evaluation on growers. Australia is, however, host to one of the largest voluntary soil carbon credit issuances. In January 2021, Microsoft bought soil carbon credits through [Regen Network](#) as part of their CarbonPlus Grassland credit program in Australia. Despite quantification and verification obstacles, national and international actors participate in Australia's regulated market.

Interest in soil carbon markets extends beyond Australia. In the US, there is growing support for pending congressional acts (e.g., the [Growing Climate Solutions Act](#)). President Biden also signed an executive order in January 2021 to address the climate crisis and the desire for soil carbon standardization that will lead to monetization. As a result, some of the major voluntary forest carbon credit developers are beginning to research expansions to soil carbon. To support credit development, there is an influx of

early-stage companies (e.g., Nori), many blockchain based, that are creating verified marketplaces for carbon, water, and biodiversity outcomes. Funds and projects, such as ReHarvest Partners, are responding to corporate demand for voluntary carbon credits. As soil carbon credit demand and supply grow, the market will attract and require more capital.

Investment opportunities in this space breakdown across (a) measurement tool and technology companies, (b) transaction-based market platforms, and (c) farmland real asset funds or food brands testing and incorporating measurement frameworks and carbon credits.

For tools, available measurement technologies vary from on-farm data collection to drone- or satellite-level data collection. Soil carbon and other outcomes can vary greatly not only by crop type, geography, and practice, but even within a single farm or hectare. This variation complicates the data collection process and necessitates balancing data modeling with ground truthing. Directing capital toward quantification and verification standards for soil carbon credits could be an effective use of philanthropic capital and catalyze a more robust, uniform market. Technologies that collect real-time data, however, are where ROIs and opportunities to scale exist.

On-farm data collection relies on tools that can collect real-time data. For example, [Quick Carbon](#) uses spectrometers to estimate soil carbon and has been piloted at [Stone Barns](#). Traditional sampling, on the other hand, is sent to nearby laboratories. This collection and testing process can be slower but verifies and improves soil carbon models. As demand for soil carbon credits grows, university laboratories will need greater capacity to process an increased volume of and additional details about samples. In March 2021, for example, [FedEx gave a \\$100 million gift to Yale](#) for a research center that will focus on developing nature-based solutions to climate change — including regenerative agriculture. Currently, on-farm data collection can be time consuming, expensive, and rely on the extrapolation of a small number of data points to the farm level. Broader technologies complement on-farm data collection and can help fix these problems.

Drone- and satellite-level data collection can take a farm or landscape level view to collect environmental

outcome metrics. For example, [Upstream Tech](#), which uses satellite data and machine learning to assess the results of regenerative practices across farms and conservation program areas, is a major partner for many of the detailed examples. Its platform can make recommendations for best practices, especially for water outcomes, based off data analyses. Most of these data collection companies are paired with proprietary software that offers land management best practices and other recommendations. A 2020 partnership between Microsoft and Land O'Lakes, for instance, pairs the [Azure FarmBeats](#) program and [TruTerra](#), a sustainable farming platform. Through this collaboration, better sustainable management practices are recommended and impact across Land O'Lakes grower partners is confirmed. Grower and corporate involvement in measurement provide various avenues for capital to flow.

Collectively, farm management software is expected to be worth \$4.22 billion globally by 2025.<sup>xxvii</sup> Drones for agriculture space allegedly reached an investment peak in 2015 with \$326 million of investments. Costs did not go down enough to make drone-use realistic for most growers. Drones, however, are seeing a resurgence in interest and in new financing rounds during the pandemic due to social distancing and supply chain traceability requirements.<sup>xxviii</sup> Data collected by agriculture technologies on environmental outcomes, however, is only useful if it can be appropriately analyzed.

Carbon and other environmental outcomes require methodologies or frameworks that allow for accurate accounting. Many existing and developing frameworks are still tracking, testing, and proving the biogeochemical results of agricultural practices. Because regenerative agriculture best practices can vary by geographies, crop types, and myriad other factors, establishing methodologies and frameworks could be an ongoing process. In the meantime, multiple methodologies and frameworks exist to assess regenerative agriculture performance.

Grower adoption might be limited due to the number and variability of frameworks. In the US, one of the most used frameworks across companies and funds is the [COMET-Farm](#) tool provided by the USDA. In Europe, the [Cool Farm Tool](#) developed through multiple European universities is one of the most used frameworks. Individual researchers, universities,



consulting companies, and other actors have their own frameworks that they are piloting across companies and funds, such as the Ecosystems Services Market Consortium. Several funded projects through the USDA-NRCS Conservation Innovation Grant program point to the desire for baseline information to be established within the next few years to support standardized frameworks at a national level.

## DEPARTMENT OF AGRICULTURE, NRCS, FOUR BASICS FOR SOIL HEALTH<sup>xxix</sup>

1. **USE DIVERSE SPECIES TO INCREASE DIVERSITY IN THE SOIL**
2. **MANAGE SOILS MORE BY DISTURBING THEM LESS**
3. **KEEP PLANTS GROWING THROUGHOUT THE YEAR TO FEED THE SOIL**
4. **KEEP THE SOIL COVERED AS MUCH AS POSSIBLE**

### Key challenges for investors to consider include:

- **Price of carbon and capital efficiency:** Environmental outcomes need to cover the costs of verification. There also needs to be security in a minimum price of carbon to allow for capital-efficient methods. Accurate outcomes will require on-farm testing accompanied by more advanced data modeling tools. Security in a carbon price can occur through voluntary credit agreements that guarantee long-term pricing or through regulatory carbon market prices.
- **Long-term viability:** Projects rely on standardized tools and frameworks that reach a critical mass of companies, funds, and growers. Currently, there is a high degree of competition among different technologies and approaches fighting for scale.
- **Scalability:** Technologies may not be accurate and easily scalable, as approaches are dependent on region and crop. Apart from the accuracy concerns associated with scaling across geographies and crops, it is also important for there to be growth partnerships to achieve scale. Instead of going farm-by-farm to

sell a product or service, distribution and corporate partnerships are key for most technologies' success. Additionally, technology providers and users need to be aware which costs are falling on growers and affecting their bottom line — perhaps pushing them away from regenerative agriculture. Approaches that do not consider grower costs and needs, as seen with the early agri-drone space, may not be successful because they ignore the low-margin and risk-averse realities of growers, which translates to a lack of sales and adoption of new technologies.

## 3. **NOVEL FINANCING FRAMEWORKS AND OUTCOMES BASED FINANCING**

**Growers need access to time-sensitive capital, tied to the right incentives, to support the transition of existing farmland to regenerative systems.**

Financing frameworks catered specifically to the capital and timing issues faced by growers are needed to support small-scale growers, the transition of industrial farmland to regenerative systems, and the growth of existing regenerative farms. As with the transition to organic, there are barriers for growers to transition to regenerative agriculture production. Immediate upfront cost and delayed gains leave a financing gap similar in length to the three years faced by organic growers. Reorienting financing frameworks could help to solve this problem.

Financing frameworks need to connect environmental and social outcomes to farm-level profitability and move away from yield prominence and misaligned incentives in industrial agriculture. This requires innovative thinking and conversations with grower communities to develop novel financing frameworks. Lessons learned from financial models in renewable energy or other outcomes-based sectors are easily translatable to regenerative agriculture and digestible for traditional investors and financiers. Internalizing environmental externalities and paying for ecosystem services, as with the True Cost Accounting system researched by TIFS and the [Global Alliance for the Future of Food](#), could also incentivize regenerative agriculture adoptions.

Investment opportunities in this space include (a) farmland and real asset funds (e.g., The Perennial Fund

and rePlant) and (b) financial platforms for farmland investment (e.g., Steward). Current funds focused on the farmland transition financing gap are detailed more in Appendix B, including across their different geographies, ownership models, and approaches. A suite of financial platforms that offer crowdfunding investment opportunities in farmland, both regenerative and industrial, have also been developed over the past few years.

#### Key challenges for investors to consider include:

- **Pooling risks:** These approaches involve the pooling of multiple farm projects into one fund or platform — meaning rigorous due diligence for the funds or financial platforms. This requires investment teams with experience converting farmland real assets to sustainable agriculture practices, setting a standardized methodology for evaluating farmland projects (e.g., on-farm management ability to convert to or grow regenerative agriculture projects), and establishing appropriate long-term relationship management and tracking capabilities.
- **Partnerships:** Financial success in this space is dependent on appropriate partnerships. These include corporate partnerships for access to growers and large-scale supply chains, retailer partnerships for a farmland pipeline, or research partnerships for ensuring data accuracy.

## 4. PROCESSING, STORAGE, AND DISTRIBUTION DEVELOPMENT

**As farmlands transition to regenerative systems, the creation of regional and identity-preserved processing, storage, and distribution (or midstream) infrastructure is needed to ensure regenerative foods reach consumers.**

Agriculture over the past half century has leaned toward increasing consolidation and commodification to drive down unit economics and reach scale, leaving local midstream infrastructure abandoned. There is a major opportunity in processing, storage, and distribution infrastructure compared to, for example, addressing mismatched demand and supply with technology-enabled marketplaces. As with scaling organic agriculture, regenerative agriculture requires regionally-centered midstream infrastructure and new infrastructure development in emerging markets where

it is lacking. To recoup the costs, this infrastructure will require new capabilities.

Regeneratively-grown foods and products will ultimately be sold at a price premium to consumers. To justify more expensive products, customers expect clear positive environmental impacts — meaning they want identity-preserved and transparent products. Despite the midstream supply chain representing a significant set of costs (up to 40% in some markets), it is the space where CREO has anecdotally seen the least investment activity.

The opportunity in processing is not specific to regenerative agriculture. There are marginal transition costs from organic to regenerative agriculture processing, especially in terms of facility requirements for certifications. Growers and investors should be aware that facilities that commingle products might jeopardize organic and regenerative certifications. Depending on the product, though, there may be opportunities for overlap and to participate in both markets. The currently available opportunity is investing in organic infrastructure where there is established demand and where there is a need to limit the midstream costs the organic sector faces. Variable costs across the supply chain (e.g., transportation and other intermediary costs) could be replaced with fixed costs of regional or in-house midstream infrastructure. For example, one company specializing in regenerative and organic midstream infrastructure saw up to a 65% reduction in variable costs as it transitioned to its own midstream facilities. Capital is beginning to address the midstream organic and regenerative agriculture opportunity. For example, [Pipeline Foods](#) acquired SunOpta's specialty and organic soy and corn business for \$66.5 million, building on previous grain elevator and other existing asset acquisitions.<sup>xxx</sup> Sustainable infrastructure investment needs to match, if not exceed, that of sustainable agriculture.

In 2017, there were 5.5 million acres of organic farmland across 16,000 farms in the US — up from four million acres across 14,000 farms in 2008.<sup>xxxi</sup> There remains, however, a lack of infrastructure for processing and storage of organic output, including grain elevators and freezers. The lack of facilities has resulted in barriers to entry, such as higher transportation costs that erase the revenue gain from an organic premium and sometimes result in the product being sold as an industrial crop at a lower

price point. Of about 8,700 grain elevators operating in the US in 2016, only 3% were certified to handle organic crops.<sup>xxxii</sup> [Mercaris](#) and Pipeline Foods estimated that there are less than 200 certified organic grain and oilseed handlers in North America — with about half of them not having access to larger markets through direct service from a railroad. Apart from anecdotal evidence that this is a barrier for growers, a 2017 report showed that access to processing and storage was an obstacle to transition for 63% of surveyed growers.<sup>xxxiii</sup> Additional capital is critical to build midstream infrastructure and bridge the divide between upstream and downstream opportunities. Investment opportunities in this midstream space

## SUPPORTING CONSERVATION THROUGH REGENERATIVE AGRICULTURE<sup>xxiv</sup>

Throughout the 20th century, grassland bird populations in North America endured dramatic declines as 99% of tall grass native prairie habitat was lost. Seeing the connection between regeneratively-managed lands and improved grassland bird populations, the National Audubon Society developed the Conservation Ranching Initiative with an associated bird-friendly certification.

Sold through partners like [Blue Nest Beef](#), the program and certification developed partnerships with ranchers across the Midwest and West with standards to improve four areas, including habitat management, forage and feeding, animal health and welfare, and environmental sustainability. As most migratory grassland bird species spend winters in Northern Mexico, Audubon conducted a landscape study in 2017 in the Chihuahua region to consider the expansion of the Conservation Ranching Initiative to the area.

Results from the study highlighted one major barrier to supporting regenerative ranchers in Northern Mexico: midstream processing, storage, and distribution infrastructure. The region is not developed and had historically been supported by funding from industrial agriculture players in the US. Processing, storage, and distribution infrastructure that is accessible and affordable for a growing number of conservation ranching partners in the region was absent. Future projects in Mexico and internationally, therefore, are dependent on existing infrastructure or co-development of infrastructure alongside the conservation ranching programs.

include (a) companies that are building out midstream capabilities (e.g., Pipeline Foods, one of the largest organic buyers in the US), (b) infrastructure financing through funds that directly or indirectly target developing midstream capabilities (e.g., Steward), (c) farmland funds or consumer brands with vertically-integrated structures (e.g., Agriculture Capital), and (d) technology companies in midstream infrastructure that connect platforms or improve efficiencies (e.g., cold storage management platforms).

**Key challenges to consider for those looking to invest in midstream infrastructure are included below. Investment opportunities and growth expectations are drawn from the broader organic space. Given the nascency of the regenerative agriculture supply chain and market, there is limited data and financial metrics.**

- **Strategy for exit:** Trade sales are less likely for regenerative agriculture specific strategies in regionalized build outs — reducing the pool of available end buyers.
- **General strategy:** CREO has seen limited discount in the market for operating new businesses versus those scaling traditional businesses. This translates to more opportunities offering top-line growth strategies (e.g., cross selling or product portfolio expansion) than bottom-line synergies, which are more dependent on regulation.
- **Rightsizing:** Figuring out the best size and operation styles for facilities is critical, as midstream processing, storage, and distribution is capital intensive and inflexible. For fund strategies targeting greenfield or brownfield development (i.e., building new facilities or purchasing and leasing existing facilities), a track record in forecasting utilization in novel markets is key. Facilities too small may not reach the economies-of-scale unit costs needed to compete with other manufacturers, whereas facilities too large may not reach full utilization.

## 5. CONSUMER CONNECTION

**To support premium prices and increase demand, consumer understanding between regenerative agriculture and positive impacts needs to be created.**

Where organic has been successfully recognized by consumers as having reduced levels of toxins and pollutants in food, regenerative agriculture can build on top of that for consumers to recognize the increased nutritional quality of food grown under these practices, as well as the environmental and social benefits of regenerative systems. Along with increasing demand, this connection can lead to product price premiums that can flow back to growers to support their transition and operations until practices and products are scaled to mass market access and prices through corporate adoption.

Investment opportunities in this space include (a) CPG brands with strong marketing and transparency programs (see OSC2 examples below), (b) venture-ready technologies that develop supply chain transparency or the connection between regenerative agriculture products and nutrition, (c) marketplaces for regenerative agriculture products (e.g., [Thrive Market](#)), and (d) diversified farm business models that include on-farm hospitality and consumer education. Opportunity (d) is a smaller area for capital deployment that is most appealing to family office-owned farmland operations and not a major investment vehicle.

Several large corporates have committed to and marketed regenerative practices by discussing the importance of soil health — including Annie's (General Mills), Kashi (Kellogg's), or Patagonia Provisions. Major corporates acquiring natural food brands highlights the opportunity for investors to scale regeneratively-focused brands — especially those with built-out marketing channels and mass-market access. Technologies that track regenerative agriculture companies and their products can expand price premiums.



### PERIODIC TABLE OF FOOD PROJECT

[Periodic Table of Food Initiative \(PTFI\)](#), which has initial funding from The Rockefeller Foundation, is a global effort to create a public database of the biochemical composition and function of the world's foods. The project has begun selecting and cataloguing 1,000 foods that will be analyzed with state-of-the-art mass spectrometry kits and bioinformatic tools.

PTFI's technical platform — low-cost mass spectrometry kits, analytical standards and methods, and cloud-based computing — is coupled with a public database to help democratize and standardize food composition metrics. Once the database is active, the scientific community and private sector can build on this public resource by adding analyses of additional foods, varieties, and cooking methods. The platform will enable rapid research and innovation acceleration that deepens our understanding about the connection between regenerative practices and food composition and nutrition.

PTFI expects its platform to support analyses, especially for start-ups and corporates, on the impact regenerative practices on nutrient quality. Results can inform farm sourcing and food cultivation as well as improve consumer understanding about the connections among agriculture, production, food composition, and human health. This project can legitimize claims about regenerative agriculture impacts, especially around nutrition, that will also improve companies' ability to build successful marketing strategies.

### ONE STEP CLOSER TO AN ORGANIC AND SUSTAINABLE COMMUNITY (OSC2)<sup>xxxv</sup>

OSC2 is a food business leadership community with a vision to create a more regenerative, just, and prosperous world. Participant companies collaborate, share knowledge, and support peers on operations and marketing. Many participant companies use soil health, sustainability, or some other form of regenerative agriculture as a core part of their branding and marketing.

[Alter Eco](#), for example, an organic chocolate company, committed \$10 million to convert 20,000 acres in its supply chain to regenerative agriculture. It was acquired by a private equity company for an undisclosed amount in 2017. Other participant companies include [Kuli Kuli](#), [Numi](#), [Organic Valley](#), [Sambazon](#), [Guayaki Yerba Mate](#), [Rebbl](#), [Miyoko's](#), [Gaia Herbs](#), and [Happy Family](#). OSC2 has three working groups, one of which is the Climate Collaborative that seeks to catalyze bold climate action among natural products companies.



There are a suite of technology companies and organizations providing tracking and transparency services, especially through blockchain, that fit venture investors' criteria. Other companies are building on the nutrition opportunity by strengthening the connection between regenerative food and nutrient quality. [TeakOrigin](#), for example, is an early-stage technology company focused on understanding and communicating the nutritional value of foods across the supply chain. Other approaches take it a step further — bringing you to the regenerative experience (as opposed to vice versa).

Diversified farm business models mostly consist of farms with on-site hospitality and regenerative agriculture education. New companies and advisories that facilitate on-farm hospitality could provide an additional revenue stream for farms. For example, [Sagra](#) uses its hospitality experience to create temporary accommodation and dining infrastructure on regenerative farms.

**Key challenges to consider for the consumer connection space are included below. Investment opportunity and growth expectations are drawn from the broader natural food space.**

- **Marketing strategy:** The success of CPG food brands will be dependent on the minimization of customer acquisition and other brand building costs.
- **Technological adaptation:** As with other technology plays in agriculture, success will be dependent on scaling through key partners (e.g., corporates) that will deploy innovation more quickly than manufacturers.
- **Volume constraints:** There are limited supplies of regeneratively-produced ingredients. Startups may more easily enter the regenerative agriculture supply chain through incremental scaling compared to legacy companies that need to transition their developed supply chains. This gives an advantage to pure regenerative agriculture brands.



## MAJOR CERTIFICATIONS

[Bee Better](#) supported by the [Xerces Society for Invertebrate Conservation](#). The certification is focused on best practices that support pollinator health, such as hedgerows, and reduced chemical input usage. Haagen-Dazs is one of the program's supporters.<sup>xxxvi</sup>

[Demeter Biodynamic](#) supported by [Demeter International](#), started in 1985. The certification builds on organic to incorporate biodynamic processes centred on following the cycles of nature in a self-contained and self-sustaining manner. The certification is on over 5,000 farms in 60 countries, representing over 400,000 acres (161,874 hectares).<sup>xxxvii</sup>

[Regenerative Organic Certification \(ROC\)](#) supported by the [Rodale Institute](#) and [Patagonia](#). ROC builds on organic to incorporate regenerative practices across soil health, animal welfare, and social fairness. In 2019, the certification program completed pilot projects with 19 farms and brands, including Dr. Bronner's and Patagonia Provisions. Sites processing seeds or crops derived from genetically-modified sources are not eligible for certification.

[Sustainably Grown](#) supported by [SCS Global](#). The global certification covers environmental, social, and economic best practices. Its supporters include Chiquita, Del Monte, and Harris Fresh.<sup>xxxviii</sup>



## ADDITIONAL ENRICHMENT AREAS



### 1. KNOWLEDGE SHARING

**Regenerative agriculture is complicated. Best practices vary across crops, geographies, and various other factors. Thus, continual knowledge sharing of best practices among those in the space is needed to galvanize grower interest and allow farms to cost-effectively transition.**

Investing in farmland, platforms, and advisory companies or deploying blended finance and catalytic capital to support brands, funds, and other programs could significantly boost community knowledge sharing on regenerative agriculture. Ensuring that investments offer both knowledge sharing and market-rate returns is a challenge. As a result, blended finance, catalytic capital, and philanthropy are more appropriate capital models for knowledge sharing opportunities.



## FARM MANAGEMENT ADVISORIES

[Bio-Logical Capital](#) and [Soil Capital](#) are two major farmland investors and advisors focused on building soil health and regenerative practices. Achieving financial and ecological returns in regenerative agriculture takes time and learning from mistakes. Working with multiple operations to learn about best practices and business models replicated on individual farms and in major corporate supply chains, these organizations have accumulated significant knowledge about regenerative agriculture.

Bio-Logical Capital is a Colorado-based land advisory, investment, and development company focused on regenerative systems that include animals and perennial crops. It works with landowners and investors around the United States through long-term operating and management agreements to improve farm operations, provide advisory services, and develop short-term projects. One of their projects is Philo Ridge Farm, a 400-acre (162-hectare) farm integrating grass-fed livestock, pastured poultry, vegetable, and perennial fruit and nut production. The investment firm is working with Philo Ridge to develop poultry processing infrastructure for the farm and nearby community and to increase processing capacity to 20,000 birds a year. This minimizes costs for the community and provides an additional revenue stream for the farm. Philo Ridge is vertically-integrated and processes all its products on-site — educating visitors on the farm's practices and creating a consumer connection through farm hospitality. Bio-Logical Capital has partnered with the Vermont Land Trust through a NRCS Conservation Innovation Grant to cover the cost of other farms converting to similar soil health and grazing practices. University of Vermont is evaluating field-level outcomes for these projects — focused on finances, social impacts, soil carbon sequestration, and water and biodiversity outcomes. It plans for the results to serve as a foundation for future USDA support of measuring and tracking environmental outcomes.

Soil Capital is a Brussels-based farmland advisory and agriculture platform started in 2014. It has advised farm management across Europe and Latin America, including a project with a major European food brand to transition 20 farms across eight countries toward using cover crops, compost, and rotational grazing. It is also developing mySoilCapital, a decision-support and reward platform to enable regenerative transitions. This digital solution enables growers to assess their economic and GHG performance by crop and activity, benchmarking their results against relevant peers. Improvements in their GHG profile year-on-year (i.e., reduced emissions or increased sequestration) can be transformed into ISO-compliant carbon credits through the Soil Capital carbon program and sold into the voluntary market. This can generate a new source of revenue for farmers and incentivize regenerative agriculture adoption. Soil Capital markets carbon credits in partnership with South Pole, and the GHG assessments are based on the Cool Farm Tool. The platform allows Soil Capital to work with many family growers and small-scale farmers, which manage the vast majority of agricultural land globally. Soil Capital is deploying the platform and the carbon program in France and Belgium, with its English version coming online in the UK in 2021. Soil Capital plans to continue its expansion across Europe and into Latin America.



## 2. ON-FARM MACHINERY AND TECHNOLOGIES

**Regenerative systems mimic natural systems and require a different suite of on-farm machinery and technologies.**

Regenerative agriculture entails spending more time on land and collecting data to enable consumer connectivity and traceability that will drive a price premium. Industrial farming, in contrast, focuses on scale and spending minimal time to maximize efficiency. Without robotics, there is concern that increased labor costs with regenerative agriculture may steer interest away from the industry or encourage exploitation of farm workers — a problem seen in the organic space.

Investment opportunities in this space include (a) machinery and technology companies that are producing new farm equipment (e.g., mechanical weeding from [Naïo Technologies](#), [ViTiBOT](#), and [Greenfield Robotics](#)) and (b) precision agriculture hardware and software companies (e.g., [ecoRobotix](#) and [TartanSense](#)).

Decreased hardware and battery costs and improved battery performance, against a backdrop of increasing labor costs in the agriculture industry, have created favorable tailwinds for robotics and precision agriculture. For example, DowDuPont (now [Corteva](#)) acquired a software company focused on agricultural efficiency and profitability named [Granular](#) in 2017 for \$300 million; [Deere & Company](#) acquired an agriculture robotics company named [Blue River](#) in 2017 for \$305 million; and, more broadly, Monsanto (now [Bayer](#)) acquired an agricultural weather, soil, and field data company named [Climate Corp](#) in 2013 for \$930 million. Large fundraises have also occurred, such as [Precision Hawk](#) (a remote sensing and data processing company) raising over \$130 million in funding. While none of these acquisitions or fundraises took place within the specific framing of regenerative agriculture, they indicate industry interest in technologies that can support regenerative agriculture. While software solutions can run the gamut, current prospects for robotics in regenerative agriculture are narrow.

For regenerative agriculture approaches in robotics, opportunities are most likely to be in pest and weed management solutions. Wider automation solutions are typically geared for providing efficiencies on industrial farms instead of enabling technology for regenerative

approaches. Increasing crop resistances to herbicides and labor costs creates an opportunity to scale successful solutions that minimize input usage into the wider agriculture industry. Hardware, as opposed to software, poses particular problems.

Key issues, beyond the general challenges of developing robotics, include customer retention and the business model dilemma of offering capital equipment as opposed to SaaS. Customer relationships are critical for supporting an eventual exit, as major manufacturers with lower costs of capital (and higher R&D budgets) can increase competition for early start-ups that have demonstrated market potential. Capital equipment sales are also challenging, as growers fear technological obsolescence from short development cycles (around five years). Growing operations are most likely to lease new technologies, while stable smaller farms tend to stick with older technologies they can fix themselves. SaaS models allow growers greater flexibility for adoption, trading utilization rates for customer adoption. Additionally, on-farm capital spending for commodity crop growers fluctuates with prices, so there is a risk that products are launched during unfavorable spending seasons.



### 3. PERMANENT CROPS

**Tree crops remain difficult for growers and investors to transition to regenerative systems, while an important part of biodiverse and carbon-rich systems.**

Investment opportunities in this space include agroforestry-centered funds, permanent crop focused companies, and technology and machinery specific for harvesting tree crop systems. Key challenges in this space lie with more difficult growing needs (e.g., more inputs) for permanent crops that make regenerative agriculture at scale financially difficult. Many farmland funds can introduce a couple practices, like cover crops and pollinator habitats, into their systems but scaling to large 4,000+ hectare (almost 9880+ acre) farms is more difficult.



### PROPAGATE VENTURES

[Propagate Ventures](#) is a farm-as-a-service company and platform focused on integrating permanent crops, such as a fruits, nuts, and timber, into existing farmlands. The platform provides investors an opportunity to find and engage with agroforestry, silvopasture, and marginal habitat projects that have planted over 250,000 trees. In partnership with growers, it finances the installation and management of trees. Profits from the crops are shared between Propagate Ventures and the growers. For investors, the projects are expected to be grouped into funds as well as diversified by location and crop type to manage risks. Propagate raised a \$1.5 million Seed round in May 2020 and is a portfolio company of [Elemental Excelsior](#) and the [Techstars Sustainability Accelerator](#).<sup>xxxix</sup>



### 4. SMALL-SCALE GROWERS

**Most growers globally, and within corporate supply chains, are small-scale growers that need financial and technical support to continue or transition to regenerative growing.**

Investment opportunities in this space include brands focused on small-scale growers and platforms or emerging economy-centered funds. The smaller amounts of investment needed per farm, compared to US or European farms, highlights not only the capital leveraging potential for investments in emerging economies but also the need for investment vehicles that aggregate projects to mitigate risks and support conventional return profiles. A key challenge is ensuring transparent supply chains that support small-scale growers.



## FORESTED FOODS

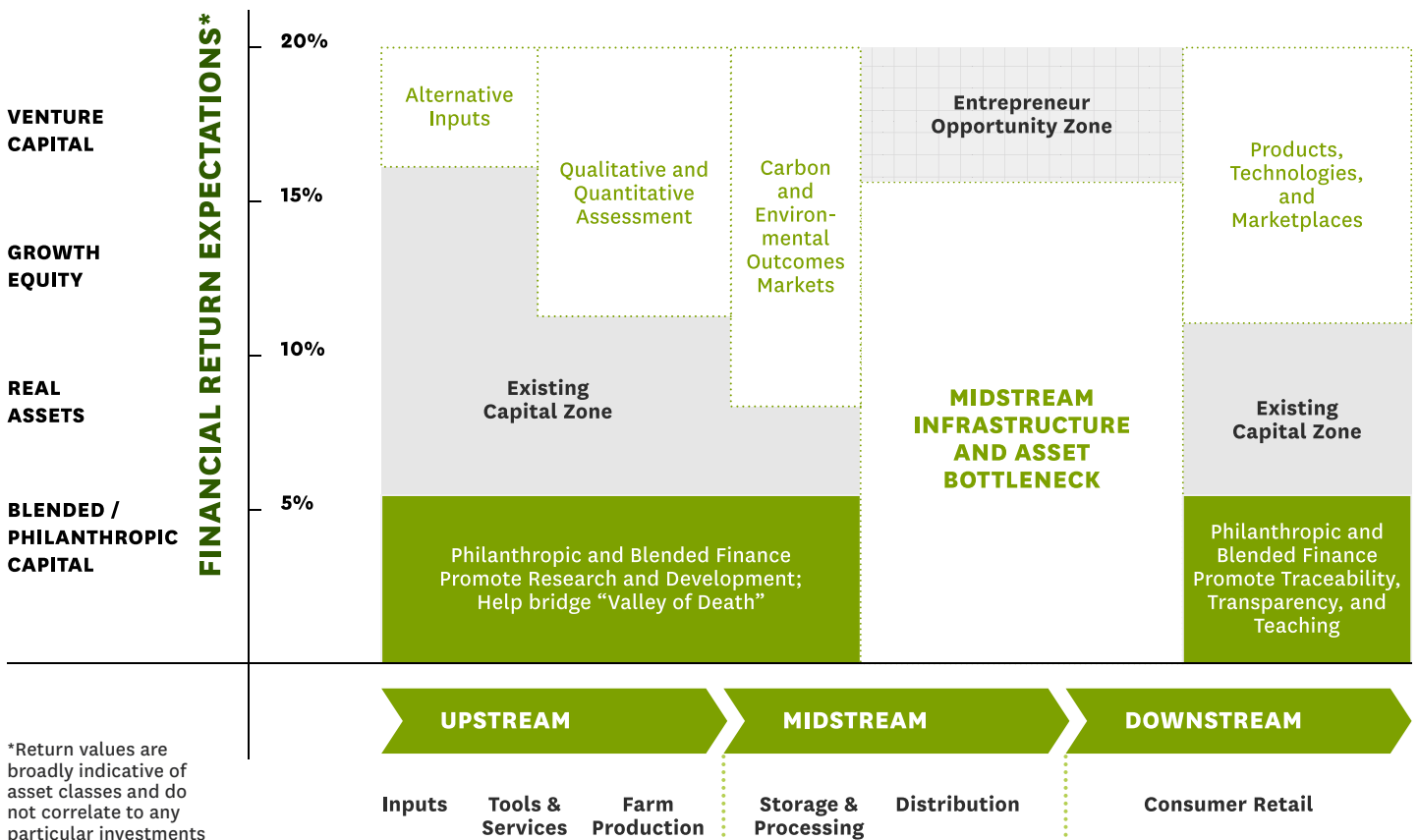
[Forested Foods](#), based in Ethiopia and New York, has an agriculture distribution model that supports small-scale growers and conservation. Through an agroforestry-based model, they simplify midstream market channels for non-timber forest products, such as honey or spices. The company connects small-scale growers in Ethiopia to North American markets that allows for higher prices to feedback to the grower and the reintegration or continuance of regenerative agriculture and agroforestry practices. Their model replaces and streamlines complicated sourcing, processing, and distribution operations to directly connect grower groups and coops to ingredient importers, natural products brands, and direct to consumers. The company completed a proof of concept importing to the US around their honey brand, Maryiza, in 2018 and 2019.]

Investment opportunities include various combinations of these five white spaces and four enrichment areas. While investment in white spaces that directly impact regenerative agriculture may offer commercial investors more readily-available opportunities than enrichment areas, companies profiled below target various combinations of these regenerative agriculture gaps. Before diving into these companies and their operations, gaps across the entire regenerative agriculture supply chain and capital stack are mapped.

# Company & Fund Profiles

Conversations with dozens of investors have exposed a perceived lack of investment opportunities in regenerative agriculture, especially for market-rate investors. Mapping the white spaces against the capital stack and supply chain reveals existing capital investments have emphasized upstream production. Venture capital, growth equity, real assets, and debt focused on inputs, tools, and services while blended philanthropic capital focused on production. These areas offer “shovel ready” investment opportunities with a variety tested risk-return profiles and strategies. At the same time, mapping the examples shows where novel approaches can help break bottlenecks, for instance in midstream processing, storage, and distribution.

CREO Members and other experienced investors in CREO’s network have offered the following detailed examples of companies and funds with commercial and impact viability. These examples have raised over \$1.2 billion in investment capital. They exemplify the funding and return potential for firms targeting the white spaces CREO has identified. Together, these detailed examples benchmark the current — and quickly evolving — regenerative agriculture landscape and indicate the types of deals that investors might see going forward. Mapping the detail examples against the capital stack and supply chain reveals how these companies can fill the white spaces identified above.





FUNDS:

Agriculture Capital



The Perennial Fund



ReHarvest Partners



rePlant Capital



COMPANIES:

Benson Hill



Farm Ferments



Nori



Rizoma



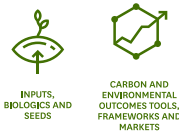
Soil Heroes



Steward



Trace Genomics



Vence



# Agriculture Capital<sup>xl</sup>

TYPE: **FUND**YEAR FOUNDED: **2014**HQ: **SAN FRANCISCO, CA, USA**INVESTMENT HISTORY: **\$750M RAISED**RETURN PROFILE: **MARKET RATE AGRICULTURE REAL ASSET FUND**GEOGRAPHIC FOCUS: **USA (WEST COAST), AUSTRALIA (VICTORIA AND NEW SOUTH WALES)**CROP FOCUS: **PERMANENT CROPS**AREAS IMPACTED: **20,000 (8,094 HECTARES)**SOIL CARBON SEQUESTRATION EST.: **15,569 TONS OF CO<sub>2</sub>E (2019)**[HTTPS://AGRICULTURECAPITAL.COM/](https://agriculturecapital.com/)INPUTS,  
BIOLOGICS AND  
SEEDSCARBON AND  
ENVIRONMENTAL  
OUTCOMES TOOLS,  
FRAMEWORKS AND  
MARKETSNOVEL FINANCING  
FRAMEWORKS AND  
OUTCOMES BASED  
FINANCINGIMPROVED  
MIDSTREAM  
PROCESSING AND  
DISTRIBUTIONCONSUMER  
CONNECTIONKNOWLEDGE  
SHARINGON FARM  
MACHINERY AND  
TECHNOLOGIESPERMANENT  
CROPSSMALL-SCALE  
GROWERS

## OVERVIEW

Agriculture Capital (AC) is a vertically-integrated farmland investment fund focused on permanent crops in California, Oregon, and Australia. Through two funds, it has acquired and converted degraded or underperforming land to regenerative or organic blueberry, citrus (including sumo citrus), grape, and nut farms. It operates three subsidiaries: AC Farming, AC Brands, AC Nursery and Genetics. After realizing there were not enough nearby facilities to keep up with its production, Agriculture Capital integrated infrastructure investments into its work — increasing processing, storage, and distribution capacity for its retail sales. These facilities include additional packing and scanning equipment to manage quality and waste.

## COMMERCIAL VIABILITY

Agriculture Capital reduces risk and volatility across its operations and portfolio. Along with differentiating crops in multiple geographies, Agriculture Capital manages its own processing, storage, and distribution infrastructure to reduce costs normally dispersed throughout the supply chain. The firm also has a citrus genetics and breeding business to introduce new varieties of specialty produce and nuts into the market sooner than its competitors.

## SCALABILITY & REPLICABILITY

Agriculture Capital holds expertise across the supply chain and manages a portfolio of various types of assets and crops — minimizing early risks and costs of transitioning to regenerative agriculture. Companies working in other geographies and with other crop types can learn about how to create regionally-supported supply chains with processing, storage, and distribution facilities from Agriculture Capital. This approach, while generating transparency and control, means that scaling is limited by the acquisition and transition of real assets, like farmland and infrastructure.

## ENVIRONMENT

Agriculture Capital has incorporated hedgerows, cover crops, water storage and conservation, and organic requirements into its operations. Such practices, especially with its blueberries, have increased native pollinator populations and reduced dependence on bees. The firm is working with Upstream Tech and Colorado State University to measure its carbon and other environmental impacts. While the company is not selling carbon credits, it also uses the COMET-Farm tool and a third-party verifier for carbon accounting and understanding the impact of its practices on the land. Agriculture Capital has obtained a Sustainability Grown Certification from SCS Global Services for its grape business and a Bee Better certification on two additional farms. It also works to improve its facilities' energy and water efficiency through tracking, technology upgrades, and real-time fixes. Agriculture Capital releases an annual impact report detailing its practices, impacts, and information collection methodologies.

## SOCIAL

Agriculture Capital focuses on rebuilding and supporting local economies by providing full-time employment to partners. One of its partners is [California Harvesters, Inc.](#), a labor trust supporting the employment of in California's agriculture workers.<sup>xli</sup> Agriculture Capital aims to offer more continuous employment opportunities in its operations through skill development sessions that support workers in citrus and table grapes, which have different employment seasons that span most of the year. Its internal tracking mechanism, AC Way, is focused on labor issues, including employee rights and safety, human resource policies, and employee benefits and welfare.

# The Perennial Fund

TYPE: **FUND**YEAR FOUNDED: **2020**HQ: **BOULDER, CO, USA**INVESTMENT HISTORY: **\$8.5M FUND**RETURN PROFILE: **IMPACT INVESTING**GEOGRAPHIC FOCUS: **USA (MIDWEST AND INNER MOUNTAIN WEST)**CROP FOCUS: **ROW CROPS**AREAS IMPACTED: **UP TO 10,000 (4,047 HECTARES)**[HTTPS://THEPERENNIALEFUND.ORG](https://theperennialfund.org)INPUTS,  
BIOLOGICS AND  
SEEDSCARBON AND  
ENVIRONMENTAL  
OUTCOMES TOOLS,  
FRAMEWORKS AND  
MARKETSNOVEL FINANCING  
FRAMEWORKS AND  
OUTCOMES BASED  
FINANCINGIMPROVED  
MIDSTREAM  
PROCESSING AND  
DISTRIBUTIONCONSUMER  
CONNECTIONKNOWLEDGE  
SHARINGON FARM  
MACHINERY AND  
TECHNOLOGIESPERMANENT  
CROPSSMALL-SCALE  
GROWERS

## OVERVIEW

The Perennial Fund is a blended finance investment vehicle focused on providing loans of \$50-\$1,000 per acre for growers to bridge the 36-month transition period toward regenerative production. The fund is an extension of [Mad Agriculture](#), a non-profit started in 2015 to support growers transitioning to regenerative agriculture practices and to assist with farm planning, financial support, and crop market development. Over 10 years, the fund aims to provide three-year loan with a 10-50% gross revenue share based on forecasted crop rotation, yield, and market conditions while keeping the farm viable. The fund is targeting a 9% net IRR and additional support from the USDA and other public grants.

## COMMERCIAL VIABILITY

There is a large market for farm finance and expertise as growers transition to organic and regenerative farming, which The Perennial Fund can provide. The fund also partnered with the Regenerative Organic Certification — providing product premiums and increased profits that will flow back to the farms and

to the fund. As an early adopter of the certification, the fund will benefit from a shortened supply chain between its supported products and certification as well as pre-purchase agreements.

## SCALABILITY & REPLICABILITY

The Perennial Fund model benefits from the scalability and capital efficiency of fintech. Its loan-based model more efficiently scales across farms than other asset-based financing frameworks.

## ENVIRONMENT

The fund is committed to regenerative agriculture and healthy soil practices. Through a CIG grant from NRCS, The Perennial Fund is also working on a long-term carbon and environmental outcomes project that can provide standardized tracking across actors. This work is in partnership with John Lundgren at the [Ecdysis Foundation](#) and Steven Apfelbaum at [Applied Ecological Services](#) — two expert institutions in soil carbon and biodiversity.

## SOCIAL

Building on its Mad Agriculture roots and expertise, the fund is directly continuing, expanding, and transitioning growers to regenerative or organic agriculture farms with financial and practical support. The fund prioritizes grower success by helping them with debt management and forgiveness avenues.

## INVESTOR PERSPECTIVE

**Investor:** Family Office Investment Firm

**Investment Details:** Anchor Investor

### Key Reasons for Investment:

1. As opposed to buying and converting land, the loan support structure is a more capital efficient model to transition more acres/hectares per dollar invested.
2. From interviews with over a dozen growers and partners, it was clear that the team has deep agriculture expertise in farm systems, regenerative transitions, and on-the-ground grower support. Growers expressed comfort with the team given its cultural authenticity.
3. The team's close relationship with growers that have experience in organic transitions helps minimize pipeline and project development risks.
4. The team can grow the regenerative agriculture supply chain by facilitating partnerships among actors (e.g., carbon credit purchase agreements) in its supply chain and grower ecosystem.



# ReHarvest Partners

TYPE: **FUND**YEAR FOUNDED: **2020**HQ: **WASHINGTON, DC, USA**INVESTMENT HISTORY: **\$7.5M+ FUND + TARGET**RETURN PROFILE: **MARKET RATE AGRICULTURAL REAL ASSET FUND**GEOGRAPHIC FOCUS: **USA (IOWA AND MIDWEST)**CROP FOCUS: **ROW CROPS**AREAS IMPACTED: **120,000 (48,563 HECTARES)**SOIL CARBON SEQUESTRATION ESTIMATE: **7,500 TONS CO<sub>2</sub>e**
[HTTPS://WWW.QUANTIFIEDVENTURES.COM/SOIL-AND-WATER-OUTCOMES-FUND](https://www.quantifiedventures.com/soil-and-water-outcomes-fund)
INPUTS,  
BIOLOGICS AND  
SEEDSCARBON AND  
ENVIRONMENTAL  
OUTCOMES TOOLS,  
FRAMEWORKS AND  
MARKETSNOVEL FINANCING  
FRAMEWORKS AND  
OUTCOMES BASED  
FINANCINGIMPROVED  
MIDSTREAM  
PROCESSING AND  
DISTRIBUTIONCONSUMER  
CONNECTIONKNOWLEDGE  
SHARINGON FARM  
MACHINERY AND  
TECHNOLOGIESPERMANENT  
CROPSSMALL-SCALE  
GROWERS

## OVERVIEW

ReHarvest Partners is a corporate entity and extension of the [Soil and Water Outcomes Fund](#) (SWOF). SWOF is a partnership between [Quantified Ventures](#) and the [Iowa Soybean Association](#) focused on improving Iowa croplands. Together, they recently supported a pilot project with blended finance. The fund provides revolving loans for growers to transition to conservation practices. Verified carbon and water outcomes are sold to municipalities, state and federal entities, and corporates (e.g., through a carbon credit partnership with Cargill). Revenue from the sale of environmental outcomes becomes revolving capital in the fund or returns for investors. The fund expanded from its initial test site, with the support of commercial investors, to more acres across the Midwest. ReHarvest Partners expects returns in the high teens for investors — already breaking even with its 2021 grower and environmental outcome agreements.

## COMMERCIAL VIABILITY

ReHarvest Partners is one of the earliest and largest operators of a two-sided marketplace between growers and governments/corporates in the US, as there is no existing carbon or environmental outcomes market. Its partnership with the Iowa Soybean Association and other grower groups can lead to a scalable sales pipeline of environmental outcomes. ReHarvest Partners' business model has been proven viable through a pilot project supported by the Walton Family Foundation. The early and current projects highlight blended finance opportunities through USDA grants, PRIs and MRIs, and philanthropic funding.

## SCALABILITY & REPLICABILITY

After the program's initial launch, ReHarvest Partners will be self-funded and scaled inside and outside of Iowa. The goal is to reach 100,000 acres (40,467 hectares) in Iowa and 5 million acres (2.02 million hectares) across the US by 2028. Projects reduce financial risk by modeling renewable energy project finance and guaranteeing buyers for the environmental outcomes. (Renewable energy best practices can be useful in agriculture too.)

## ENVIRONMENT

The 9,500 acres of cropland enrolled in 2020 reduced 170,000 lbs. of nitrogen and 15,000 lbs. of phosphorous and sequestered 7,500 tons of carbon. The Clean Water Act also created a marketplace for water credits generated from these acres. For measurement, the project is using the COMET-Farm tool for carbon and the Nutrient Tracking Tool for water quality. For third-party verification, the project is contracting [Sustainable Environmental Consultants](#). Accounting for various environmental outcomes bolsters early voluntary market creation and adoption, especially for carbon sequestration, and highlights the opportunity for adding other outcomes (e.g., water conservation). The goal is to also find ways to additional channels for monetization, including habitat creation for endangered species and flood protection.

## SOCIAL

Growers receive \$30-50 per acre (\$37 per acre on average) for their involvement in ReHarvest Partners programs. Half of the funding is provided at the beginning for transition costs, and the other half is provided after environmental outcomes are verified. Grower contracts for the project are expected to last five years or longer to ensure acres set aside are appropriately transitioned to regenerative agriculture.

# rePlant Capital

TYPE: **FUND**YEAR FOUNDED: **2018**HQ: **BOULDER, CO, USA**INVESTMENT HISTORY: **\$250M TARGET**INVESTMENT HISTORY: **MARKET RATE AGRICULTURAL REAL ASSET FUND**GEOGRAPHIC FOCUS: **US**CROP FOCUS: **ALL**AREAS IMPACTED: **TBA**[HTTPS://REPLANTCAP.COM/](https://replantcap.com/)INPUTS,  
BIOLOGICS AND  
SEEDSCARBON AND  
ENVIRONMENTAL  
OUTCOMES TOOLS,  
FRAMEWORKS AND  
MARKETSNOVEL FINANCING  
FRAMEWORKS AND  
OUTCOMES BASED  
FINANCINGIMPROVED  
MIDSTREAM  
PROCESSING AND  
DISTRIBUTIONCONSUMER  
CONNECTIONKNOWLEDGE  
SHARINGON FARM  
MACHINERY AND  
TECHNOLOGIESPERMANENT  
CROPSSMALL-SCALE  
GROWERS

## OVERVIEW<sup>XLII</sup>

rePlant Capital is a 10-year fund for converting farm operations to regenerative practices. Its first fund is investing in direct loans to growers and equity stakes of companies supporting the regenerative agriculture supply chain. It is expecting high single digit returns. The debt side of rePlant Capital's work provides customized outcomes-based financing for growers to improve soil health, equipment, and facilities on their land. The equity side of its work invests in agtech (e.g., on-farm technologies) and distribution companies that service the regenerative agriculture supply chain. Through combined philanthropic financing and corporate investments, rePlant Capital builds a network of partners that transitions regions or corporate supply chains to regenerative practices.

## COMMERCIAL VIABILITY

rePlant Capital operates across a wide range of large market gaps, including farm financing and debt, transition finance, and corporate sustainable agriculture supplies. Its partnership model allows the firm to work closely with corporates that provide pipeline development as well as ensured sales channels. For example, rePlant announced a partnership with Danone North America in January 2021 to invest \$20 million to support the company's farmer partners in converting to regenerative and organic farming practices.<sup>xliii</sup>

## SCALABILITY & REPLICABILITY

Transitioning corporate supply chains is one of the largest levers for converting to regenerative agriculture. Through its partnership model that focuses on corporates (e.g., Danone North America), rePlant has a high potential to serve and important role in this major stakeholder class and to scale its operations through large-scale buyers. The firm also exemplifies how offering a suite on-farm and infrastructure

financing accompanied by corporate and regional buyers can boost the transition of supply chains to regenerative agriculture.

## ENVIRONMENT

rePlant Capital is focused on the environmental benefits of soil health and regenerative agriculture. The firm works with multiple environmental and third-party verification partners, such as EcoPractices and the Rodale Institute, on best practices and environmental outcomes measurement.

## SOCIAL

rePlant Capital provides outcomes-based financing to growers that would not be able to access flexible funding from traditional sources. There is no interest on loans until the farms are certified, reducing the transition costs for growers.

## INVESTOR PERSPECTIVE

**Investor:** Combined Philanthropic and Investment Family Office

**Investment Details:** >\$1M seed funding to help launch the financial services firm

### Key Reasons for Investment:

1. rePlant Capital has a knowledgeable team with diverse and relevant professional experience. One of the founders was the previous President/CEO of [RSE Social Finance](#).
2. The fund has a simple but novel model that leverages financing already entering the space and the technical expertise of third-party verification through its partnership model.
3. rePlant Capital has a relatively small investment that can be leveraged through the fund's supply chain and partnership approach to grow the regenerative agriculture market (i.e., to act as the rudder moving a large ship forward).

# Benson Hill<sup>xliv</sup>

TYPE: **COMPANY**YEAR FOUNDED: **2012**HQ: **ST. LOUIS, MO, USA**INVESTMENT HISTORY: **\$282M+**RETURN PROFILE: **VENTURE GROWTH**GEOGRAPHIC FOCUS: **NORTH AMERICA**CROP FOCUS: **ROW AND SPECIALTY CROPS (E.G., SOY AND YELLOW PEAS)**[HTTPS://BENSONHILL.COM/](https://BENSONHILL.COM/)INPUTS,  
BIOLOGICS AND  
SEEDSCARBON AND  
ENVIRONMENTAL  
OUTCOMES TOOLS,  
FRAMEWORKS AND  
MARKETSNOVEL FINANCING  
FRAMEWORKS AND  
OUTCOMES BASED  
FINANCINGIMPROVED  
MIDSTREAM  
PROCESSING AND  
DISTRIBUTIONCONSUMER  
CONNECTIONKNOWLEDGE  
SHARINGON FARM  
MACHINERY AND  
TECHNOLOGIESPERMANENT  
CROPSSMALL-SCALE  
GROWERS

## OVERVIEW

Benson Hill is a biotech and food innovation company that combines data analytics and plant biology to create better performing and healthier crop varieties. Using data science, plant biology, machine learning and AI, CRISPR and gene sequencing, and consumer and retail insights, Benson Hill's CropOS design platform quickly and cheaply develops new crop varieties optimized for health and sustainability. Investor interest in Benson Hill's health-focused food highlights the value associated with transitioning away from yield optimization in crop research and developing alternative crops. Benson Hill is also a response to growing interest in the agriculture industry on the connection between crops and nutrition.

## COMMERCIAL VIABILITY

Crop services and plant-based proteins (especially from soy) have large addressable markets. Benson Hill's attention to the health and nutrition characteristics of seeds and crops will benefit from increasing consumer demand for healthy foods. Its Series D funding round included several strategic and institutional investors, such as Louis Dreyfus, Caisse de dépôt et placement du Québec (CDPQ), a Canadian pension fund manager, and co-lead investor GV (formerly Google Ventures).

## SCALABILITY & REPLICABILITY

Benson Hill's CropOS benefits from the scalability potential of technology platforms. With distribution partners across the supply chain, Benson Hill also benefits from a strategic scaling opportunities.



## ENVIRONMENT

While focused on plant-based protein crops, Benson Hill's technology can be adapted to support the adoption of new seeds in regenerative agriculture. Crop varieties' impact spans across their life cycle and the agricultural supply chain. Certain varieties can lead to decreased water usage on farms or replace soy protein concentrate processes and decrease water usage during production.

## SOCIAL

The improvement of crop varieties reduces risks and costs for growers.

## CURRENT INVESTOR PERSPECTIVE

**Investor:** Food and Agriculture Venture Capital Firm

**Investment Details:** Series B, C, C1, and D

### Key Reasons for Investment:

1. Benson Hill has a stand-alone platform, unlike other seed breeding companies, and is a full supply chain player. Its work impacts the agricultural supply chain process from end to end, from processing capabilities to marketing those products downstream.
2. Benson Hill created a closed loop system where it implements learnings from actors across the supply chain and makes genetic-level changes to optimize crop health, nutrition, and sustainability.
3. The company developed a technical capability that incorporates CRISPR and allows them to rethink and expand its go-to-market strategy and business model.

# Farm Ferments

TYPE: **COMPANY**YEAR FOUNDED: **2017**HQ: **HUDSON, NY, USA**INVESTMENT HISTORY: **\$1.2M**RETURN PROFILE: **IMPACT INVESTING**GEOGRAPHIC FOCUS: **USA (NORTHEAST)**CROP FOCUS: **SPECIALTY**AREAS IMPACTED: **50-100 (20-40 HECTARES)**[HTTPS://FARMFERMENTS.COM](https://farmferments.com)INPUTS,  
BIOLOGICS AND  
SEEDSCARBON AND  
ENVIRONMENTAL  
OUTCOMES TOOLS,  
FRAMEWORKS AND  
MARKETSNOVEL FINANCING  
FRAMEWORKS AND  
OUTCOMES BASED  
FINANCINGIMPROVED  
MIDSTREAM  
PROCESSING AND  
DISTRIBUTIONCONSUMER  
CONNECTIONKNOWLEDGE  
SHARINGON FARM  
MACHINERY AND  
TECHNOLOGIESPERMANENT  
CROPSSMALL-SCALE  
GROWERS

## OVERVIEW

Farm Ferments is a CPG food company that spun out of the [Hawthorne Valley Association](#), a non-profit biodynamic farm in upstate New York. Its mission is to create a market for regenerative agriculture in the Hudson Valley and to serve as an example of regional food hub development. The company is producing sauerkrauts, beverages, and hot sauces for wholesale to grocery stores, private labels, co-packers, and food kit companies. In 2020, Farm Ferments reached \$1.6M in sales. It works with 13 farms — 10 regenerative and three organic — within the Hudson Valley.

## COMMERCIAL VIABILITY

Fermented and probiotic foods continue to see major growth and consumer demand, similar to the success of early yogurt companies. Farm Ferments' 20,000 square foot processing plant is the key to its growth. The company acquired the facility to create its value-added products. The plant, which includes cold storage and co-packing capabilities, is a long-term investment that will provide cost savings for Farm Ferments' processing and additional revenue streams.

## SCALABILITY & REPLICABILITY

Farm Ferments presents a model for developing regional food hubs with complete supply chains that support community regenerative practices and that connect consumers to their food.

## ENVIRONMENT

As part of the greater Hawthorne Valley Association, Farm Ferments focuses on biodynamic, regenerative, and organic farmland. Along with the support of regenerative growers, Farm Ferments' value-added products also reduce farm and food waste by using less valuable or unwanted products (i.e., seconds) that cannot be sold to retail customers.

## SOCIAL

To assist knowledge sharing and the growth of a regional regenerative agriculture supply chain, Farm Ferments hosts annual agriculture forums where growers can share best practices, discuss the region's farm landscape, and prepare production and sales forecasts for following years. Farm Ferments' coronavirus pandemic preparedness allowed it to increase labor opportunities for workers in the region who had lost restaurant employment. The company is moving toward alternative ownership and social innovation structures that better represent employees and stakeholders.

## CURRENT INVESTOR PERSPECTIVE

**Investor:** Combined Philanthropic and Investment Family Office

**Investment Details:** Seed Stage

### Key Reasons for Investment:

1. Farm Ferments' strong focus on shorter regional supply chains and local manufacturing infrastructure makes it more resilient to disruptions (e.g., pandemics). Investing in real assets and processing capacity also creates diversified revenue streams that can increase the company's value.
2. The company is creating products that match high demand for fermentation and probiotic goods.
3. Built from the Hawthorne Valley Association, Farm Ferments benefits from the existing regional brand recognition and marketing.
4. Farm Ferments supports alternative ownership and has taken advantage of novel financing. For example, RSF Social Finance supported the acquisition and debt of the processing facility.

# Nori<sup>xlvi xlvi</sup>

TYPE: **COMPANY**YEAR FOUNDED: **2017**HQ: **SEATTLE, WA, USA**INVESTMENT HISTORY: **\$5M+**RETURN PROFILE: **VENTURE SEED**GEOGRAPHIC FOCUS: **NORTH AMERICA**CROP FOCUS: **ALL**AREAS IMPACTED: **60,000 (24,281 HECTARES)**[HTTPS://NORI.COM](https://nori.com)INPUTS,  
BIOLOGICS AND  
SEEDSCARBON AND  
ENVIRONMENTAL  
OUTCOMES TOOLS,  
FRAMEWORKS AND  
MARKETSNOVEL FINANCING  
FRAMEWORKS AND  
OUTCOMES BASED  
FINANCINGIMPROVED  
MIDSTREAM  
PROCESSING AND  
DISTRIBUTIONCONSUMER  
CONNECTIONKNOWLEDGE  
SHARINGON FARM  
MACHINERY AND  
TECHNOLOGIESPERMANENT  
CROPSSMALL-SCALE  
GROWERS

## OVERVIEW

Nori is a blockchain marketplace for carbon offsets focused on increasing the supply of verified carbon removal projects to meet increasing demand from corporates and other groups. Nori verifies carbon projects and issues Nori Carbon Removal Tonnes (NRTs). Those NRTs can be exchanged for a cryptocurrency called NORI tokens. As with other cryptocurrencies, the value of the NORI tokens shifts according to market-based supply and demand. NORI tokens are not yet live, so sales are currently settled in cash at \$15/tonne. The platform allows any individual, investor, or corporate to buy carbon offsets. Nori is beginning to partner with corporates, such as Shopify, on pre-purchased NRTs. Nori completed a \$4M seed round, which included strategic blockchain investors.

## COMMERCIAL VIABILITY

As a two-sided marketplace, Nori meets the needs of two customer types: growers trying to monetize the carbon potential of their land and investors or individuals looking to support nature-based carbon removal solutions. Nori is one of the earliest carbon and environmental outcomes platforms in an increasing competitive space. As an early mover, its methodologies could be the first to be widely reviewed and accepted. The opportunities for companies in this space could be influenced by the activities of existing large voluntary markets and increase interest in creating regulatory soil carbon markets.

## SCALABILITY & REPLICABILITY

Nori has high potential to scale as a technology platform. Its model could also be the archetype for best practices and standards in the creation of a regulatory carbon market.

## ENVIRONMENT

Carbon monetization will increase growers' interest in and access to capital for adopting regenerative practices. While Nori is supporting the development of more energy efficient blockchain technologies, the energy intensiveness of blockchain is important to note. Nori partners with Soil Metrics (which relies on the COMET-Farm tool) to implement its soil carbon methodology.

## SOCIAL

Growers can access additional revenue and receive greater margins from carbon monetization as Nori streamlines the verification process.

## CURRENT INVESTOR PERSPECTIVE

**Investor:** Early Tech Investment Firm

**Investment Details:** Seed

### **Key Reasons for Investment:**

1. Nori CEO Paul Gambill is thoughtful and disciplined. He is passionate about both the impact and economic viability of Nori's business model.
2. Nori fills a marketplace gap needed for investing in nature-based solutions and regenerative agriculture.
3. As a thought leader with a renowned podcast, Nori benefits from associated marketing in the nature-based carbon removal space.



# Rizoma

TYPE: **COMPANY**YEAR FOUNDED: **2018**HQ: **SÃO PAULO, SP, BRAZIL**INVESTMENT HISTORY: **\$13M+**RETURN PROFILE: **MARKET RATE AGRICULTURE REAL ASSETS**GEOGRAPHIC FOCUS: **BRAZIL**CROP FOCUS: **LIVESTOCK, ROW AND PERMANENT**HECTARES IMPACTED: **1,200**SOIL CARBON SEQUESTRATION ESTIMATE: **2,238 CO<sub>2</sub>E (2020)<sup>xlvi</sup>**[HTTPS://RIZOMA-AGRO.COM/](https://rizoma-agro.com/)INPUTS,  
BIOLOGICS AND  
SEEDSCARBON AND  
ENVIRONMENTAL  
OUTCOMES TOOLS,  
FRAMEWORKS AND  
MARKETSNOVEL FINANCING  
FRAMEWORKS AND  
OUTCOMES BASED  
FINANCINGIMPROVED  
MIDSTREAM  
PROCESSING AND  
DISTRIBUTIONCONSUMER  
CONNECTIONKNOWLEDGE  
SHARINGON FARM  
MACHINERY AND  
TECHNOLOGIESPERMANENT  
CROPSSMALL-SCALE  
GROWERS

## OVERVIEW

Rizoma is an agriculture supply chain developer focused on regenerating one million hectares of land in Brazil by 2030. Rizoma spun out of [Fazenda da Toca](#), a major egg producer in Brazil. The company is working with land in Brazil's Cerrado region, one of the most threatened forest habitats in the world. It plans to convert degraded pasturelands to regenerative agriculture that utilizes silvopasture and agroforestry practices. Rizoma currently leases and operates farmland that has been converted to regenerative agriculture for livestock, grains, soy, and permanent crops (e.g., citrus). To support this new market segment, Rizoma has adopted a vertical integration model for identity-preserved regenerative agriculture products that are currently not supported by infrastructure in the region. The company has a biologics production facility culturing fungi and bacteria to produce inputs that can be applied to its farms. Rizoma is also conducting seed development research, analyzing the soil and environmental outcomes of its practices, and growing an export entity for wholesale to the US market.

## COMMERCIAL VIABILITY

Rizoma is a full supply chain player and therefore benefits from cost synergies, greater control of production, and diverse revenue streams. Its production has the same yields for corn, soy, and citrus as industrial production. Slightly higher costs are balanced by price premiums. Securing special purpose vehicle financing and a green bond issued in February 2020, Rizoma demonstrates how multiple financing sources can fund operations. The green bond was the first agricultural green bond issued under the [Climate Bonds Standard](#) for a 1,200-hectare regenerative/organic project.<sup>xlvi</sup> Rizoma also has institutional financing support through the credit provider Rabobank.

## SCALABILITY AND REPLICABILITY

Rizoma's strategy is to partner with the growing number of global corporates attempting to develop their own regenerative agriculture supply chains. Rizoma also exemplifies how companies can attract more institutional investment by leveraging novel financing sources (e.g., agricultural green bonds that can act as an alternative to philanthropic or blended finance approaches).

## ENVIRONMENT

Rizoma operations include both organic and regenerative practices that meet high export demands, especially from the US, for identity-preserved organic grains and specialty crops. Practices on its land include agroforestry, silvopasture, crop rotation with green manure, and integrated livestock management. Rizoma uses the World Resources Institute's local Brazilian agriculture GHG protocol to measure its impacts. It releases the impact results in reports and works with Brazilian universities, [Climate Smart Group](#), and [Imaflora](#) for third-party verification.

## SOCIAL

Rizoma is building a regional hub for regenerative and organic agriculture that changes consumer and grower behavior. To facilitate this shift, it convenes grower communities in the area to teach best practices for farms and facilities.

# Soil Heroes

TYPE: **COMPANY**YEAR FOUNDED: **2018**HQ: **ROTTERDAM, NETHERLANDS**INVESTMENT HISTORY: **\$5M+**RETURN PROFILE: **VENTURE SEED**GEOGRAPHIC FOCUS: **EUROPE**CROP FOCUS: **ALL**HECTARES IMPACTED: **4,000**[HTTPS://WWW.SOILHEROES.COM/](https://www.soilheroes.com/)INPUTS,  
BIOLOGICS AND  
SEEDSCARBON AND  
ENVIRONMENTAL  
OUTCOMES TOOLS,  
FRAMEWORKS AND  
MARKETSNOVEL FINANCING  
FRAMEWORKS AND  
OUTCOMES BASED  
FINANCINGIMPROVED  
MIDSTREAM  
PROCESSING AND  
DISTRIBUTIONCONSUMER  
CONNECTIONKNOWLEDGE  
SHARINGON FARM  
MACHINERY AND  
TECHNOLOGIESPERMANENT  
CROPSSMALL-SCALE  
GROWERS

## OVERVIEW

Soil Heroes provides a platform for regenerative growers to access buyers in Europe and elsewhere seeking technologically-verified practices. Through Soil Heroes' Fair Chain process, companies can connect with growers to buy products or measure and confirm the results of regenerative agriculture practices. The company started at a farm in the Netherlands that was converted to regenerative agriculture practice. It produced Tomasu soy sauce — the only microbrewed soy sauce in Europe. Soil Heroes has also partnered with a foundation that open-sources its farming best practices and impact measurement. The foundation ensures environmental and social responsibility remains embedded in the company's work. The Fair Chain process serves as a proof-of-concept project for Soil Heroes' future work across financing, outcomes collection, and supply chain management for regenerative agriculture in Europe.

## COMMERCIAL VIABILITY

Soil Heroes meets the demand from consumers and corporates, which have committed to sustainable and responsible agriculture practices, for transparent products.

## SCALABILITY AND REPLICABILITY

As a two-sided marketplace, Soil Heroes benefits from the scalability potential associated with a platform-based model. Soil Heroes' orientation toward corporate partnerships and dynamic supply chain positions it as a potential market leader in Europe.

## ENVIRONMENT

The goal of the company, as well as the foundation, is to support and grow the regenerative agriculture space. Its platform verifiably monitors changes in soil health and other environmental outcomes on farms and transparently reports information that buyers can communicate to consumers. Soil Heroes is working with the Cool Farm Alliance and Tool for its environmental outcome measurement.

## SOCIAL

Its platform reduces the burden on growers to find buyers and provides simplified monitoring, reporting, and verification for growers to track and communicate their impacts. The simplified flow of capital and soil health information can benefit growers working with banks and other lenders. The associated foundation supports knowledge sharing by developing tools and best practices for growers to adopt regenerative agriculture plans.

## CURRENT INVESTOR PERSPECTIVE

**Investor:** Family Office Investment Firm

**Investment Details:** Seed

### **Key Reasons for Investment:**

1. The company provides a frictionless solution for growers to transition to regenerative practices with low-cost and low-tech methods to measure and verify the ecosystem services generated.
2. Soil Heroes is an important player in building the infrastructure and marketplace for regenerative agriculture.

# Steward

TYPE: **COMPANY**YEAR FOUNDED: **2016**HQ: **PORTLAND, OR, USA**INVESTMENT HISTORY: **\$2M+**RETURN PROFILE: **VENTURE SEED**GEOGRAPHIC FOCUS: **USA AND SWITZERLAND**CROP FOCUS: **ALL**AREAS IMPACTED: **N/A**[HTTPS://GOSTEWARD.COM/](https://gosteward.com/)INPUTS,  
BIOLOGICS AND  
SEEDSCARBON AND  
ENVIRONMENTAL  
OUTCOMES TOOLS,  
FRAMEWORKS AND  
MARKETSNOVEL FINANCING  
FRAMEWORKS AND  
OUTCOMES BASED  
FINANCINGIMPROVED  
MIDSTREAM  
PROCESSING AND  
DISTRIBUTIONCONSUMER  
CONNECTIONKNOWLEDGE  
SHARINGON FARM  
MACHINERY AND  
TECHNOLOGIESPERMANENT  
CROPSSMALL-SCALE  
GROWERS

## OVERVIEW

Steward is a crowd sourcing platform for individuals and investment firms to invest in farmland. The company receives revenue from annual investment servicing fees, loan servicing fees, and loan origination fees. At the end of 2020, the platform financed 1,200 growers with 25 farms in the US and Switzerland. The company plans to adopt a fund structure like a private debt fund to further support farmland transitions. Financing opportunities include regenerative hemp farms (e.g., [Victory Hemp Foods](#)), poultry processing units, and regenerative farm deposits and expansions.

## COMMERCIAL VIABILITY

Steward focuses on channeling traditional financial vehicles — secured finance, second mortgage products, and unsecured working capital financing — onto its platform. Translating traditional financing onto the platform creates an accessible structure for investing in companies and farmland.

## SCALABILITY & REPLICABILITY

As a financial technology and platform, Steward can more efficiently scale capital than real asset approaches and therefore reach more acres of farmland. While the average farm size is one to two acres, with some reaching 150 acres (61 hectares), the platform model allows for the continual addition of small, medium, and large-scale farms.

## ENVIRONMENT

Steward is focused on improving soil health. Grower applications, developed with experienced agronomist input, are ranked on a scale of 1-5. A ranking of “3” is a minimum for farms to be listed on the platform. Regenerative agriculture practices that make a farm eligible include no-till, cover cropping, rotating crops, and livestock inclusion. The company is a certified B Corp and a registered public benefit corporation.



## SOCIAL

Steward accounts for social and community practices, such as minimum wages for laborers, in the application review process. As part of its commitment to diversity, more than 50% of its early partner growers came from non-white backgrounds. The company additionally has an included 501c3 foundation for knowledge sharing.

## CURRENT INVESTOR PERSPECTIVE

**Investor:** Combined Philanthropic and Impact Investing Family Office

**Investment Details:** <\$1M Convertible Note

### Key Reasons for Investment:

1. The farm finance space is a large market opportunity that is quickly expanding with a large underserved community.
2. The founder built a similar platform in real estate and transferred knowledge to agriculture. He spent the last five years meeting growers and investing his own assets to fund them. Steward's competitors, on the other hand, are still developing their platforms.
3. Its model allows for underwriting productization that will provide investors with access to verified deals and growers with capital difficult to access from traditional banks.

# Trace Genomics

TYPE: **COMPANY**YEAR FOUNDED: **2015**HQ: **BURLINGAME, CA, USA**INVESTMENT HISTORY: **\$39M+**RETURN PROFILE: **VENTURE GROWTH**GEOGRAPHIC FOCUS: **US**CROP FOCUS: **ROW AND SPECIALTY**[HTTPS://TRACEGENOMICS.COM/](https://tracegenomics.com/)INPUTS,  
BIOLOGICS AND  
SEEDSCARBON AND  
ENVIRONMENTAL  
OUTCOMES TOOLS,  
FRAMEWORKS AND  
MARKETSNOVEL FINANCING  
FRAMEWORKS AND  
OUTCOMES BASED  
FINANCINGIMPROVED  
MIDSTREAM  
PROCESSING AND  
DISTRIBUTIONCONSUMER  
CONNECTIONKNOWLEDGE  
SHARINGON FARM  
MACHINERY AND  
TECHNOLOGIESPERMANENT  
CROPSSMALL-SCALE  
GROWERS

## OVERVIEW<sup>XLIX</sup>

Trace Genomics is a biotech company that developed soil microbiome tests to manage soil health and crop quality through soil science, DNA sequencing, and machine learning. In partnership with agronomists, its AI-enabled diagnostic tools improve growers' on-farm results by recommending practices to improve soil health (e.g., specific crop rotations to deploy or biologics to use). The company was selected for the FoodShot Soil 3.0 challenge in 2019 and as a World Economic Forum Technology Pioneer in 2020.

## COMMERCIAL VIABILITY

Trace Genomics' microbiome diagnostic platform and databases, combined with its recent 2020 acquisition of the soil chemistry diagnostic platform from [WinField United](#), are attractive to major corporates, ag retailers, landowners, and other key agriculture players.

## SCALABILITY AND REPLICABILITY

As a data platform and SaaS technology, Trace Genomics has great potential to scale. It also can grow regenerative agriculture by digitizing and interpreting soil properties into actionable farm interventions. Trace Genomics' platform can help establish a comprehensive soil database and verification framework across various crops, practices, and geographies. Resulting metrics standardization and validation will give growers, companies, and investors more confidence in regenerative agriculture.

## ENVIRONMENTAL

By collecting and analyzing soil microbiome data, Trace Genomics can help growers implement better regenerative practices, such as crop rotations, and calculate soil health and carbon metrics.

## SOCIAL

Growers can use Trace Genomics' technologies to plant more resilient crops, manage crop risks, avoid crop loss from disease, and increase profitability by reducing inputs and increasing yields. Price premiums and environmental outcomes from regenerative outcomes can further increase margins.

## CURRENT INVESTOR PERSPECTIVE

**Investor:** Climate Change Venture Capital and Private Equity Firm

**Investment Details:** Early Stage

### Key Reasons for Investment:

1. Trace Genomics has an expert management team, which is critical for an early-stage company in a nascent market like soil genomics. Trace's core team includes an experienced agriculture CEO, a strong technical founder, and a chief commercial officer.
2. The company has a strong investor syndicate, including quality strategic and institutional co-investors.
3. The company has flexibility through a partnership-oriented mindset that will allow for quick technology adaptation to suit the evolving market.

# Vence

TYPE: **COMPANY**YEAR FOUNDED: **2016**HQ: **SAN DIEGO, CA, USA**INVESTMENT HISTORY: **\$8.3M+**RETURN PROFILE: **VENTURE SEED**GEOGRAPHIC FOCUS: **USA AND AUSTRALIA**LIVESTOCK FOCUS: **CATTLE**AREAS IMPACTED: **2.5 MILLION (1+ MILLION HECTARES)**[HTTP://VENCE.IO/](http://vence.io/)INPUTS,  
BIOLOGICS AND  
SEEDSCARBON AND  
ENVIRONMENTAL  
OUTCOMES TOOLS,  
FRAMEWORKS AND  
MARKETSNOVEL FINANCING  
FRAMEWORKS AND  
OUTCOMES BASED  
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PROCESSING AND  
DISTRIBUTIONCONSUMER  
CONNECTIONKNOWLEDGE  
SHARINGON FARM  
MACHINERY AND  
TECHNOLOGIESPERMANENT  
CROPSSMALL-SCALE  
GROWERS

## OVERVIEW

Vence is an agtech company focused on virtual fencing and health analytics for regeneratively-managed livestock. Through livestock collars and small local towers, Vence creates virtual fencing to support increased livestock rotation. Virtual fences can be managed through a mobile or web app, replacing costly physical fences and reducing labor needs. The technology is currently deployed on 13 farms.

## COMMERCIAL VIABILITY

Up to one-third of ranching costs can come from fencing, and 28% of land is devoted to pasture<sup>1</sup> — translating to a large addressable market for virtual fencing. Vence's technology, which costs about \$35/head/year, can minimize farm expenses and maintenance costs. It can monitor livestock health from the collar, such as temperature and movement, and determine fertility or calving cycles — information valuable to ranchers. Unlike other livestock solutions, Vence's small local towers and low maintenance collars do not require frequent battery replacement or solar panel management.

## SCALABILITY & REPLICABILITY

The adoption of rotational grazing by more ranchers across North America, Australia, and other geographies provides an opportunity for Vence to scale. Its technology can be easily implemented, similar to other agtech.

## ENVIRONMENT

The conversion of intensive grazing to regenerative and rotational grazing has soil carbon benefits. Pasturelands can become carbon sinks and species habitats. The collars also prioritize using sound to humanely move cattle between grazing areas.

## SOCIAL

Vence products minimize the financial and time burden of manually running rotational grazing practices. They also give ranchers the ability to provide transparent data on their livestock to buyers.

## CURRENT INVESTOR PERSPECTIVE

**Investor:** Combined Philanthropic and Impact Investing Family Office

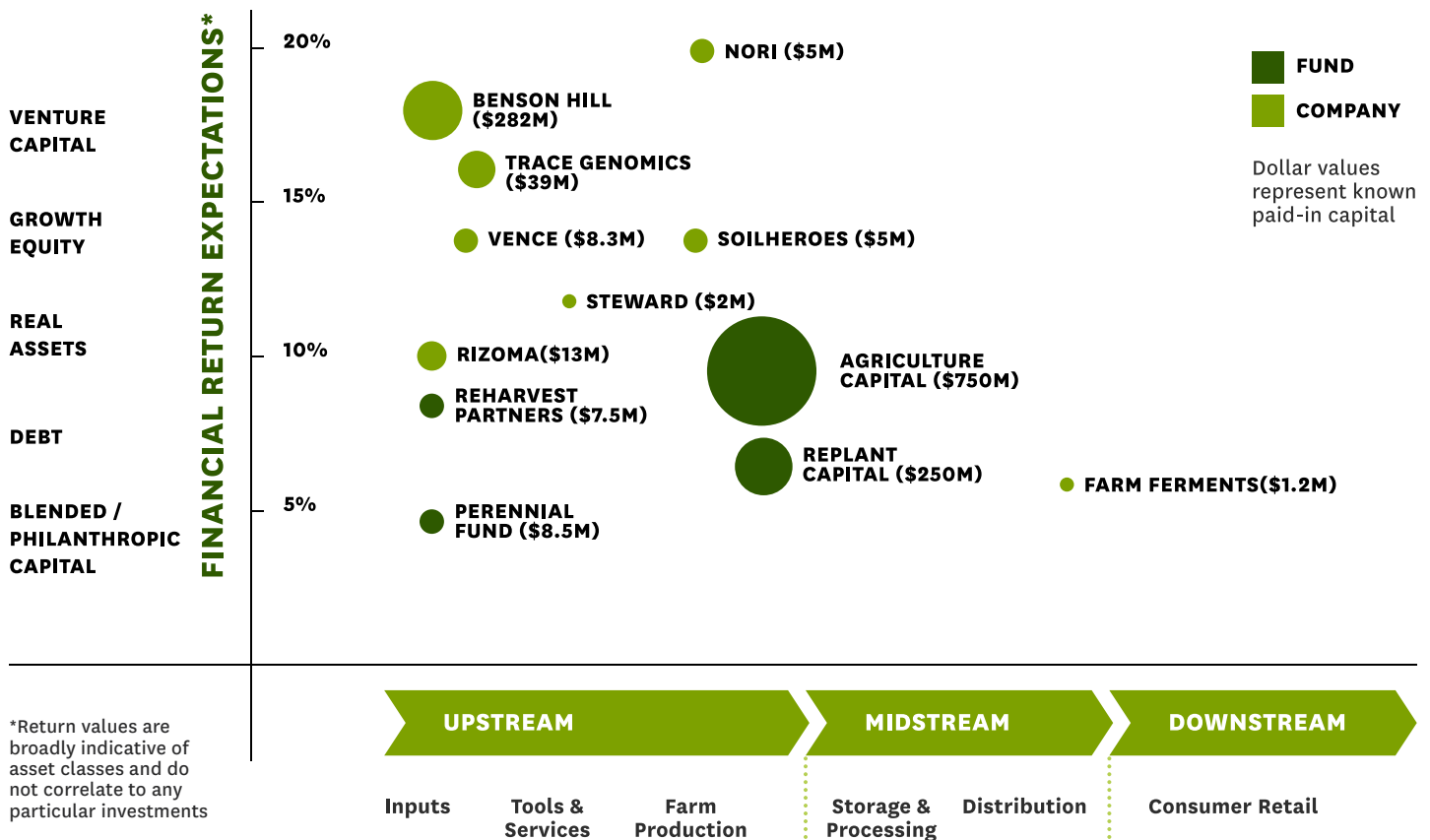
**Investment Details:** Combined \$2M+ over Series A and three previous rounds

**Key Reasons for Investment:**

1. By digitizing rotational grazing, Vance can improve the efficiency of cattle production, mitigate GHG emissions, and increase carbon sequestration.
2. Compared to its competitors, Vance's virtual livestock management and remote sensing platform can easily add features, such as health analytics and data feeds.
3. The company's supply chain tracking and transparency component will attract corporates seeking sourcing verification that demonstrates no deforestation or riparian area degradation occurred.

## MAPPING OUT THE EXAMPLES

When plotted against the supply chain and capital stack, the centrality of real asset investments and upstream venture capital are apparent. Building out these upstream and midstream segments of the supply chain could yield downstream investment opportunities. The examples described above, which are indicative of real dollar flows, also make the white spaces visually apparent.





# Moving Forward

There are myriad reasons for investors to play a larger role in the development of the regenerative agriculture supply chain and market — apart from its social and environmental impacts. Companies, technologies, and funds have grown from publicly- or philanthropically-supported pilots into major investable opportunities for commercial and institutional investors. For example, there are now CPG brands with regenerative agriculture as an underlying part of their business model and precision agriculture technologies that enable regenerative agriculture practices. Best practices and lessons learned from analogous investment spaces, such as organics, renewable energy projects, or forestry carbon markets, can be applied to regenerative agriculture investing. These emerging innovations unlock scalable investment opportunities.

Most current investments in the space involve farmland ownership, which can be an important stabilizing asset class in the portfolios of long-term investors like family offices. However, there are opportunities for investors across other asset classes to support the same goal of transitioning farmland. These include financing platforms and loan-based funds. As demand for regenerative agriculture from corporates and consumers flourishes in the coming years, additional technologies and companies will quickly reach growth stages and attract venture capital and private equity investors. Capital needs to efficiently, methodically, and appropriately flow into the regenerative agriculture supply to guarantee a robust investment landscape and avoid delays.

To ensure that individual investments are successful in this space requires an eye toward the white spaces highlighted in this report. Filling these funding gaps will support a resilient and full supply chain that can

begin to compete with industrial agriculture. The suite of detailed examples and additional companies and funds highlighted within this report show the diversity of available investment opportunities that can fit various investment portfolio needs and return profiles. An impact investing portfolio of the detailed examples would include blended finance fund opportunities for MRIs, venture capital opportunities for technology plays across company stages, and growth equity opportunities for larger ticket sizes. Even though regenerative agriculture is a new concept and practice, every source of capital in the stack has a potential investment landing spot.

Regenerative agriculture is still a nascent and growing space that will experience a great deal of change over the coming years. Verification of best practices at more granular levels, development of full regional supply chains that can act as models for wide-scale adoption, expansion of better technologies and equipment, and growth of consumer awareness and demand will benefit regenerative agriculture. The transition of major corporate supply chains could dictate regenerative agriculture scale and success. Investors can facilitate the growth of these technologies and partnerships with strategic capital deployment. Major financial institutions, whether investing in or loaning to supply chain participants, can update regulations to embrace regenerative agriculture growers. Government agencies can provide alternative public subsidies and policies that place greater importance on soil health. Customers can demonstrate their preference for sustainable products through their purchasing behavior. Regardless of where someone falls in the supply chain, they can help grow regenerative agriculture.

# Appendix A: Select Regenerative Agriculture Definitions and Practices

- A system of land stewardship, rooted in centuries old indigenous wisdom, that provides healthy, nutrient rich food for all people, while continuously restoring and nourishing the ecological, social, and cultural systems unique to every place.<sup>li</sup>

- A decision-making framework and a suite of planning processes which results in ecologically regenerative, economically viable, and socially sound management of resources. Holistic Management specifically helps land managers, farmers, ranchers, policy makers and others understand the relationship between large herds of wild herbivores and the grasslands and develop strategies for managing herds of domestic livestock to mimic those wild herds to restore balance to the land. Holistic Management is successful because it is cost-effective, highly scalable and nature-based.<sup>lii</sup>

- Regenerative farming restores the natural fertility of agroecosystems and captures more carbon than it emits. It produces nutrient-dense food, clean water, and abundant biodiversity. It integrates agroecological practices such as conservation agriculture, organic farming, agroforestry, permaculture, and holistic livestock management.<sup>liii</sup>

## From Project Drawdown: Basic Regenerative Agricultural Practices:<sup>liv</sup>

- No Tillage
- Diverse Cover Crops
- In-Farm Fertility
- No Pesticides or Synthetic Fertilizers
- Multiple crop rotations

## From the Rodale Institute's Seven Tendencies Toward Regeneration:<sup>lv</sup>

### 1. Pluralism

- Increase in diversity of plant species
- Increase in diversity of business, people, and culture
- **Increase in diversity of personal experiences, capacities, opportunities and openness to new experiences**

### 2. Protection

- More surface cover of plants, ending erosion and increasing beneficial microbial populations near the surface.
- More resistance to economic and cultural fluctuations because of quantity and variety of businesses and people, which increases overall employment and community stability.
- **Improvement of personal hardiness and an ability to withstand crisis, accompanied by a boost in the body's immune system.**

### 3. Purity

- Without chemical fertilizer and pesticide use, a greater mass of plants and other life exists in the soil.
- Without pollution of the environment, more people can exist in better health.
- **By ending detrimental habits such as smoking or thinking negatively, the potential for growth, happiness, and success increases.**

### 4. Permanence

- More perennials and other plants with vigorous root

systems begin to grow.

- As businesses and individuals become successful and stable, they can contribute more to the community.
- **New, more positive, personal spiritual behaviors take root and provide a deeper meaning to life.**

## 5. Peace

- Past patterns of weed and pest interference with growing systems are disrupted.
- Former patterns of violence and crime are reduced, improving overall security and well-being.
- **Negative emotions such as anger, fear, and hate lessen in intensity and are replaced by tolerance, compassion, and understanding.**

## 6. Potential

- Nutrients tend to either move upward in the soil profile or to accumulate near the surface, thereby becoming more available for use by plants.
- “Trickle up” economics — more resources and money accumulate and are more available to more people.
- **The positive qualities and resources in yourself and your environment become easier to access and effect more people around you.**

## 7. Progress

- Overall soil structure improves, increasing water retention capacity.
- Overall community life improves, increasing the health and wealth of its inhabitants.
- **Capacity for well-being and enjoyment increases.**

# Appendix B: Additional Farmland and Regenerative Agriculture Funds

The following are additional farmland and real assets funds focused on transitioning farms and ranches to regenerative practices. Although some of the funds below are not entirely focused on regenerative agriculture, they all support organic and regenerative agriculture practices. The information comes from conversations with the funds or best estimates from publicly available information.

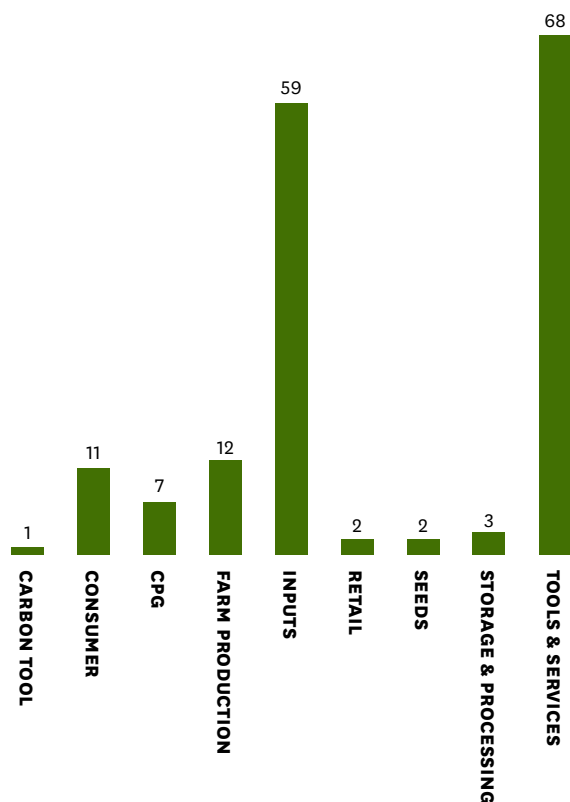
NAME	GEOGRAPHY	CROP TYPE/S	ACRES IMPACTED (HECTARES)	MODEL	FUNDING HISTORY (MM)
AGRARIAN TRUST	USA	ALL	2,400 (971)	Community land trust and community land commons that support long-term (up to 99 years) land leases to small-scale growers; Additional advising and consultation services	TBA
AGRICULTURE CAPITAL	USA (WEST COAST), AUSTRALIA	PERMANENT	20,000 (8,094)	Owning and operating; vertically integrated supply chain with nursery, genetics, midstream infrastructure, and branding subsidiaries	\$750+ USD
AREA ONE FARMS	CANADA	SPECIALTY, ROW	140,000 (56,665)	Partnership model with existing growers for farmland expansion	\$295+ USD
BELLTOWN FARMS	USA (MIDWEST)	ROW	TBA	Owning and operating farmland based on renewable energy project finance models	TBA
BLACK DIRT CAPITAL	USA (EAST COAST)	LIVESTOCK	2,200 (890)	Full supply chain operations for the cattle industry	\$1+ USD
CLEAR FRONTIER AGRICULTURE MANAGEMENT	USA (MIDWEST AND INNER MOUNTAIN WEST)	ROW	3,000 (1,214)	Owning and operating farmland	\$25+ USD
DIRT CAPITAL PARTNERS	USA (NORTHEAST)	LIVESTOCK, SPECIALTY	13,000 (5,261)	Partnership model with existing ranchers and growers for farmland expansion and other farmland assistance	\$15+ USD
FARMLAND LP	USA (NORTHWEST)	ALL	15,000+ (6,070+)	Farmland and full supply chain investments, including farm technologies and infrastructure	\$175+ USD
IMPACT AG PARTNERS	AUSTRALIA AND NORTH AMERICA	ALL	75,000 (30,351)	Owning and operating farmland	\$200 AUS
IROQUOIS VALLEY FARMLAND REIT	USA (CALIFORNIA)	ALL	13,000 (5,261)	Real estate investment trust for access to capital, mortgages, and long-term land leases	\$50 USD
KILTIR RURAL	AUSTRALIA	SPECIALTY, ROW	27,000+ (10,927+)	Owning and operating farmland and water assets	\$500 AUS
REPLANT CAPITAL	USA	ALL	TBA	Full supply chain fund, including farmland and technology, working in partnership with food corporates	TBA
SLM PARTNERS	USA (MIDWEST, AUSTRALIA)	ROW	1,135,000 (459,318)	Partnership model with existing growers for farmland expansion	\$195 USD
SUSTAINABLE WATER IMPACT FUND	USA, LATIN AMERICA, AND AUSTRALIA	SPECIALTY	100,000+	The Fund invests in specialty crops and water resources. SWIF is a formal partnership between Renewable Resource Group and The Nature Conservancy.	\$927 USD
TERRE DE LIENS	FRANCE	ALL	100+ FARMS	Community land commons and community land trust for long term grower access to farmland	€90
THE PERENNIAL FUND	USA (MIDWEST AND INNER MOUNTAIN WEST)	ROW	TBA	Farmland loans and transition assistance	\$7+ USD

# Appendix C: CREO Landscape Research

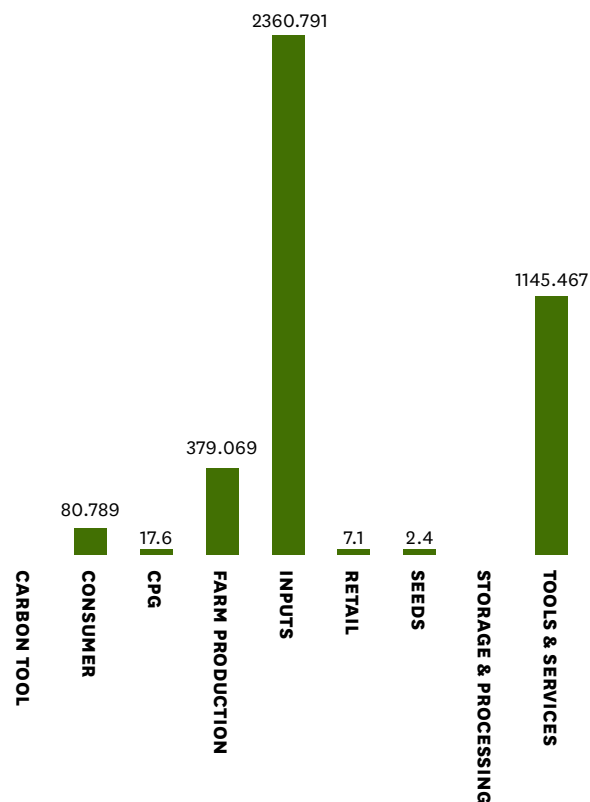
The below data offer insights on the companies and corporate commitments CREO collected for this report. Geographically, the research was focused on North America, Europe, and Australia — where investments in regenerative agriculture innovation have been most advanced. These companies cover a broad range of what could be considered regenerative agriculture. CREO recognizes this information is not a complete overview of the regenerative agriculture landscape.

The below information breaks down the 167 companies CREO researched.

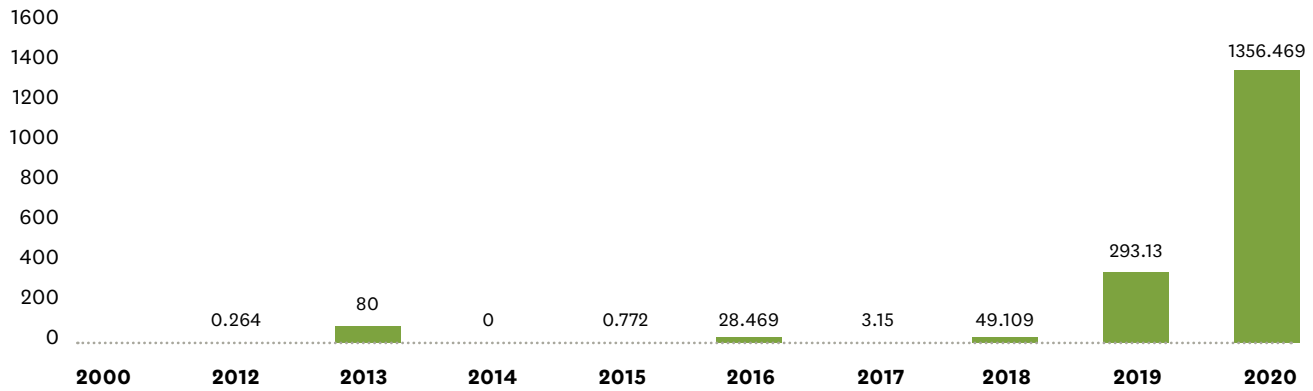
**COMPANY COUNTS BY SUPPLY CHAIN SEGMENT**



**LIFETIME FUNDS RAISED (\$M) BY SUPPLY CHAIN SEGMENT**

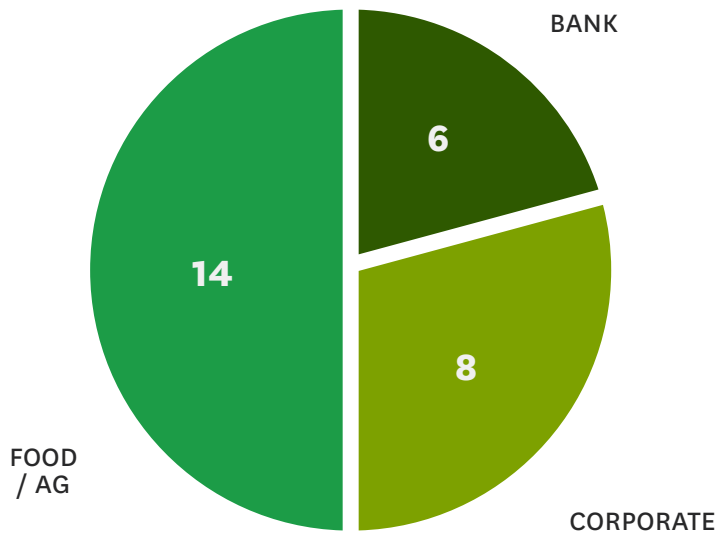


## AMOUNT RAISED IN MOST RECENT ROUND, BY YEAR (\$M, USD)



The pie chart below breaks down the 28 corporate commitments by company type.

## CORPORATE COMMITMENTS BY COMPANY CATEGORY





# Interviews & Citations

## INTERVIEWS

A special thank you to all the interviewees that CREO has spoken to over the past year and a half about their work and expertise in the sustainable agriculture space.

- Patrick Arnold, Homecoming Capital
- Frank Austin, Clear Frontier Ag Management
- Thomas Baird, Shell New Energies
- Todd Barker, Meridian Institute
- Maurice Benning, Shell Ventures
- Adam Bergman, EcoTech Capital
- Justin Bruch, Clear Frontier Ag Management
- Lara Bryant, Natural Resources Defense Council
- Emmy Cattani, Cattani Farming
- Renee Cheung, New Island Capital
- Todd Churchill, Blue Nest Beef
- Kirk Coburn, Shell Ventures
- Tad Cooke, Bio-Logic Capital LLC
- Dan Cosgrove, Growers Edge
- Matt Crisp, Benson Hill
- Tim Crosby, Thread Fund
- Lauren D'Souza, Renewable Resources Group
- Kamal Daghistani, Spring Lane Capital
- Hannah Davis, Techstars
- Olympia De Castro
- Carley Deddo, William Blair
- Adele Durfey, Clear Frontier Ag Management
- Cara Eisel, Walton Family Foundation
- Erin Eisenberg
- Cody Evans, Homecoming Capital
- Paul Gambill, Nori
- Vincent Gauthier, Environmental Defense Fund
- Alyssa Go, Renewable Resources Group
- Phil Graves, Patagonia
- Cullen Gunn, Kilter Rural
- Dave Haynes, rePlant Capital
- Tory Dietel Hopps, Dietel and Partners
- Joshua Humphreys, Croatan Institute
- Daniela Ibarra Howell, Savory Institute
- Angus Ingram, Kilter Rural
- Kevin Irby, Funders for Regenerative Agriculture (FORA)
- Eric Jackson, Pipeline Foods
- Matthew Jeffery, National Audubon Society
- Arani Kajenthira, Walton Enterprises
- Audre Kapacinskas, S2G Ventures
- Adam Kiel, AgOutcomes, Inc.
- Rosie Kissel, Armonia LLC
- Thomas Knowles, Gratitude Railroad
- Josephine Koriijn, New AJE Capital
- Alex Kremer, Tin Shed Ventures
- Sanjeev Krishnan, S2G Ventures
- Claire Lafave, NativeEnergy
- Mark Lambert, Quantified Ventures
- Chris Larson, New Island Capital
- Eric Lee-Mader, Xerces Society
- Sarah Day Levesque, Swift Communications
- David LeZaks, Croatan Institute
- Alexandra Lunt, Armonia LLC
- Moira MacDonald, Walton Family Foundation
- Caio Malufe, Hancock Natural Resource Group
- Frank Mars
- Ian Martin, Farm Ferments
- Joseph Matta, FEWL Solutions
- Veery Maxwell, Ajax Strategies
- Brian Mayers, Breakthrough Energy Ventures
- Mark McCall, iSelect Fund

- Paul McMahon, SLM Partners
- Maggie Monast, Environmental Defense Fund
- David Nicola, Blackdirt Farm Management, LLC
- Robyn O'Brien, rePlant Capital
- Poornima Parameswaran, Trace Genomics
- Joshua Phitoussi, to.org
- Rex Raimond, Transformational Investing in Food Systems Initiative (TIFS)
- Paul Rossetti, American Securities
- Aaron Rudberg, S2G Ventures
- David Rust, Sagra
- Jason Scott, Renewable Resources Group
- Anthony Sepich, Pipeline Foods
- Arohi Sharma, Natural Resources Defense Council
- Eric Smith, Grantham Environmental Trust
- James Snyder, Savory Institute
- Ethan Steinberg, Propagate Ventures
- Alejandro Trenor, Soil Capital
- Wood Turner, Agriculture Capital
- Duncan van Bergen, Shell
- Renée Vassilos, The Nature Conservancy
- Corey Vernon, Radicle Capital
- Dan Vradenburg, Trace Genomics
- Marc Weinstein, Steward
- Brandon Welch, Mad Agriculture
- Jennifer Werbitsky, Armonia LLC
- Stephen Wiedemann, Integrity Ag Services
- Frank Wooten, Vence Corp
- Ariana Yuen, Forested Foods

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Please contact Dan Matross at [dmatross@creosyndicate.org](mailto:dmatross@creosyndicate.org) with any comments or questions about this document. To view this and other CREO research, please visit [creosyndicate.org](http://creosyndicate.org)